'General Understanding' Questions

1. Explain, using examples, how a decimal number can be represented as a fixed point binary number.

   To represent decimal values, the decimal point can be fixed into a given position with the 'usual' place values to the left (representing the whole number part) but with new 'fractional' place values for the fractional part of the number.

8	4	2	1	1/2	1/4	1/8	1/16
1	0	0	0	0	1	1	0

   This binary number therefore represents the denary number 8.375. This is because after the decimal point, the binary number value is 1/4 + 1/8 = 0.375, which is added to the whole number part.

2. Convert the following fixed point binary numbers into decimal (in each case 4 bits are given to the integer part and 4 bits to the fractional part of the number):

   11001010 =**12.625**
   01111011 = **7.6875**
   11111111 = **15.9375**
   00010001 = **1.0625**

3. Convert the following decimal values into fixed point binary (in each answer provide 4 bits to the integer part and 4 bits to the fractional part of the number):

   3.25 = **00110100**
   5.5 = **01011000**
   7.1875 = **01110011**
   10.375 = **10100110**

4. Explain the issues of using this method to represent fractional values (think range and accuracy)
   - **The issue with using fixed point binary to represent fractional values in binary is that you have to compromise on range vs accuracy.**
   - **For example, if you decide to have all the bits of a bit representing integer values, it will provide you with a range of 0-255 integers, but no fractional values can be represented to increase accuracy of the number being represented.**
   - **On the other hand, using 3 bits for the integer part will provide only a range of 0-7 but will enable a fair degree of accuracy with more bits given to the fractional part of the number.**