Activity 1.4

Convert the following hexadecimal numbers into binary:

a 6 C
b 5 9
c A A
d A 0 0
e 4 0 E
f B A 6
g 9 C C
h 4 0 A A
i D A 4 7
j 1 A B 0

Converting from hexadecimal to denary and from denary to hexadecimal

To ***convert hexadecimal numbers into denary*** involves the value headings of each hexadecimal digit; that is, 4096, 256, 16 and 1.

Take each of the hexadecimal digits and multiply it by the heading values. Add all the resultant totals together to give the denary number. Remember that the hex digits A → F need to be first converted to the values 10 → 15 before carrying out the multiplication. This is best shown by two examples:

Example 1

Convert the hexadecimal number, 4 5 A, into denary.

First of all we have to multiply each hex digit by its heading value:

256	16	1	
4	5	A	
(4 × 256 = 1024)	(5 × 16 = 80)	(10 × 1 = 10)	(NOTE: A = 10)

Then we have to add the three totals together (1024 + 80 + 10) to give the denary number:

1 1 1 4

Example 2

Convert the hexadecimal number, C 8 F, into denary.

First of all we have to multiply each hex digit by its heading value:

256	16	1	
C	8	F	
(12 × 256 = 3072)	(8 × 16 = 128)	(15 × 1 = 15)	(NOTE: C = 12, F = 15)

Then we have to add the three totals together (3072 + 128 + 15) to give the denary number:

3 2 1 5

Activity 1.5

Convert the following hexadecimal numbers into denary:

a 6 B
b 9 C
c 4 A
d F F
e 1 F F
f A 0 1
g B B 4
h C A 8
i 1 2 A E
j A D 8 9

To ***convert from denary to hexadecimal*** involves successive division by 16 until the value "0" is reached. This is best shown by two examples:

Example 1

Convert the denary number, 2004, into hexadecimal.

This method involves successive division by 16 until the value 0 is reached. We start by dividing the number 2004 by 16. The result of the division including the remainder (even if it is 0) is written under 2004 and then further divisions by 16 are carried out (that is, 2004 ÷ 16 = 125 remainder 4; 125 ÷ 16 = 7 remainder 13; 7 ÷ 16 = 0 remainder 7). The hexadecimal number is obtained from the remainders written in reverse order:

16	2004				write the remainders from bottom to top to get the hexadecimal number:
16	125	remainder:	4		7 D 4 (D=13)
16	7	remainder:	13		
	0	remainder:	7		

▲ **Figure 1.2a**

Example 2

Convert the denary number, 8463, into hexadecimal.

We start by dividing the number 8463 by 16. The result of the division including the remainder (even if it is 0) is written under 8463 and then further divisions by 16 are carried out (that is, 8463 ÷ 16 = 528 remainder 15; 528 ÷ 16 = 33 remainder 0; 33 ÷ 16 = 2 remainder 1; 2 ÷ 16 = 0 remainder 2). The hexadecimal number is obtained from the remainders written in reverse order:

16	8463				read the remainder from bottom to top to get the hexadecimal number:
16	528	remainder:	15		2 1 0 F (F=15)
16	33	remainder:	0		
16	2	remainder:	1		
	0	remainder:	2		

▲ **Figure 1.2b**