

Worksheet: Denary to Binary**Converting From Denary to Binary**

The textbook (pages 112-114) has a pretty good explanation of one simple method of converting from denary to binary. Here is the calculation done in a single table converting the denary value 201 to binary.

bit position	8	7	6	5	4	3	2	1	0
exponential	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
bit value (denary)	256	128	64	32	16	8	4	2	1
difference	×	$\begin{array}{r} 201 \\ -128 \\ \hline 73 \end{array}$	$\begin{array}{r} 73 \\ -64 \\ \hline 9 \end{array}$	×	×	$\begin{array}{r} 9 \\ -8 \\ \hline 1 \end{array}$	×	×	$\begin{array}{r} 1 \\ -1 \\ \hline 0 \end{array}$
binary digits (bits)		1	1	0	0	1	0	0	1

The following is a more concise and compact version of the calculations in the table above.

denary		201	73			9			1
bit value	256	128	64	32	16	8	4	2	1
difference		73	9			1			0
binary digits (bits)		1	1	0	0	1	0	0	1

1. Given the denary number 182, complete the table.

a)

denary									
bit value	256	128	64	32	16	8	4	2	1
difference									
binary digits (bits)									

- b) Write the final 8-bit binary value here:

2. Given the denary number 125, complete the table.

a)

denary									
bit value									
difference									
binary digits (bits)									

- b) Write the final 8-bit binary value here:

Worksheet: Denary to Binary

3. For Pearson, you will only be asked to convert numbers that result in a maximum of 8 bits; however it is not any more difficult to convert larger numbers. Given the denary number 801, complete the table.

a)

denary											
bit value											
difference											
binary digits (bits)											

- b) Write the final 10-bit binary value here:

4. Back to numbers less than 8 bits. Given the denary number 255, complete the table.

a)

denary									
bit value									
difference									
binary digits (bits)									

- b) Write the final 8-bit binary value here:

5. Back to numbers less than 8 bits. Given the denary number 127, complete the table.

a)

denary									
bit value									
difference									
binary digits (bits)									

- b) Write the final 8-bit binary value here:

Notice the answers to question 4 and question 5. The value 2^8 is 256, and when we convert one fewer than this number, 255, the result is all 1's for the remaining 8 bits, so 1111_1111. The same happens with $2^7 = 128$, so 127 is 0111_1111. This is a good thing to remember to allow you to quickly convert certain numbers.

We will also study another algorithm for converting from denary to binary when we study bit shifting.