

Adding 8-bit binary numbers | Part A

Now we know how to write numbers in binary, let's see if we can add them up too. We'll start with 4 bit binary to make it easier, but it works exactly the same in 8 bit binary except there are more numbers.

So let's start with this sum:

$$0101 + 0010$$

First line the numbers up on your page so that the numbers with the same place values are directly underneath each other, like this:

$$\begin{array}{r} 0101 \\ 0010 \end{array}$$

Now, just the same as we do when we are doing denary addition in this way, we start on the right and work our way left, adding up the numbers as we go. So, $1 + 0 = 1$, we write a 1. $0 + 1 = 1$ so we write a 1. We end up with the answer 0111. If you like, you can check you are right by converting the binary to denary and adding up the numbers in your head!

Now let's try this one:

$$0101 + 0111$$

Straight away we encounter a problem – the first sum we need to add up is $1 + 1$ – I bet you never thought you'd have trouble with that sum at school!


This is binary so in this case the answer to $1 + 1$ is not 2 – we can't use anything other than a 0 or a 1. So the answer to $1 + 1$ is 10. Not ten, but two, written in binary!

We write a 0 (always the right most digit) underneath and carry the 1 to the next column

$$\begin{array}{r} 0101 \\ 0111 \\ \hline 0 \end{array}$$

Now this column is $0 + 1 + 1$ because of the remainder we carried. So it's another 10, so once again we will write a 0 and then carry the 1...

$$\begin{array}{r} 0101 \\ 0111 \\ \hline 00 \end{array}$$



Phew...this column is even trickier! It's $1 + 1 + 1$! What does that equal? 11! Write the 1 which is the right most digit underneath and carry the 1...

$$\begin{array}{r} 01101 \\ 0111 \\ \hline 100 \end{array}$$

Thank goodness, this one's easy. It's $0 + 0 + 1$ so we can just write a 1. So the answer is 1100.