

To add three binary numbers we work in exactly the same way as when we add two. We add each column separately with the same rules as for adding two numbers:

- $0+0+0 = 0$
- $0+0+1 = 1$
- $0+1+1 = 10$  (we carry the 1 and enter 0 in this column)
- $1+1+1 = 11$  (we carry the 1 and enter 1 in this column)
- $1+1+1+1 = 100$  (we carry the 1 two columns to the left and enter 0 in this column)

Example 1: Adding three binary numbers where no carry is required

$$\begin{array}{r} 1001 \\ 0100 \\ \underline{0010} \\ 1 \end{array}$$

Start at the right-hand side.  
 $1+0+0=1$

$$\begin{array}{r} 1001 \\ 0100 \\ \underline{0010} \\ 11 \end{array}$$

Go to the next column.  
 $0+0+1=1$

$$\begin{array}{r} 1001 \\ 0100 \\ \underline{0010} \\ 111 \end{array}$$

Continue with each of the following columns.  
 $0+1+0=1$

$$\begin{array}{r} 1001 \\ 0100 \\ \underline{0010} \\ 1111 \end{array}$$

For the most leftmost column it is:  
 $1+0+0 = 1$

Example 2: Adding three binary numbers where a simple carry is required

$$\begin{array}{r} 1001 \\ 0011 \\ \underline{0100} \\ 1 \\ 0 \end{array}$$

Start at the right-hand side.  
 $1+1+0=10$   
So we carry the 1

$$\begin{array}{r} 1001 \\ 0011 \\ \underline{0100} \\ 11 \\ 00 \end{array}$$

Go to the next column.  
 $0+1+0+1=10$   
So we carry the 1

$$\begin{array}{r} 1001 \\ 0011 \\ \underline{0100} \\ 111 \\ 000 \end{array}$$

For the next column:  
 $0+0+1+1=10$   
So we carry the 1

$$\begin{array}{r} 1001 \\ 0011 \\ \underline{0100} \\ 1111 \\ 0000 \end{array}$$

For the next column:  
 $1+0+0+1 = 10$   
So we carry the 1

$$\begin{array}{r} 1001 \\ 0011 \\ \underline{0100} \\ 1111 \\ 10000 \end{array}$$

Finally put the final carry in the leftmost column

Example 3: Adding three binary numbers where a more complicated carry is required

$$\begin{array}{r} 1011 \\ 0011 \\ \underline{0111} \\ 1 \\ 1 \end{array}$$

Start at the right-hand side.  
 $1+1+1=11$   
So we enter 1 and carry the 1

$$\begin{array}{r} 1011 \\ 0011 \\ \underline{0111} \\ 1 \ 1 \\ 01 \end{array}$$

Go to the next column.  
 $1+1+1+1=100$   
So we carry the two columns to the left

$$\begin{array}{r} 1011 \\ 0011 \\ \underline{0111} \\ 1 \ 1 \\ 101 \end{array}$$

For the next column:  
 $0+0+1=1$   
So we enter 1

$$\begin{array}{r} 1011 \\ 0011 \\ \underline{0111} \\ 1 \ 1 \ 1 \\ 0101 \end{array}$$

For the next column:  
 $1+0+0+1 = 10$   
So we carry the 1

$$\begin{array}{r} 1011 \\ 0011 \\ \underline{0111} \\ 1 \ 1 \ 1 \\ 10101 \end{array}$$

Finally put the final carry in the leftmost column