

Binary Addition and Binary Shifts Knowledge Organiser

Binary Addition

To add 8 bit binary numbers you need to know the addition rules:

$$0 + 0 = 0$$

$$0 + 1 = 1$$

$$1 + 0 = 1$$

$$1 + 1 = 0 \text{ carry } 1$$

$$1 + 1 + 1 = 1 \text{ carry } 1$$

8 Bit binary Addition Example

Carry	1	1	1		1			
Bin 1	0	0	1	1	0	1	0	1
Bin 2	0	1	1	1	0	1	0	0
Ans	1	0	1	0	1	0	0	1

Binary Shift

Shift to the right to Divide, Shift to the left to Multiply

Multiply

128	64	32	16	8	4	2	1
0	0	0	0	1	0	1	0

The above number is 10

128	64	32	16	8	4	2	1
0	0	0	1	0	1	0	0

The above number is 20

The original number has doubled (multiplied by 2), what has happened is the number has shifted one place to the left, by inserting a new 0 on the right (in red)

Divide

128	64	32	16	8	4	2	1
0	0	1	0	0	0	0	0

The above number is 32

128	64	32	16	8	4	2	1
0	0	0	1	0	0	0	0

The above number is 20

The original number has halved (divided by 2), what has happened is the number has shifted one place to the right, by inserting a new 0 on the left (in red)

Note: shifting by one place means multiplying or dividing by 2, shifting two places means multiplying or dividing by 4, three places means multiplying or dividing by 8 and so on.