

Addition and Multiplication

1st	2nd	and	or
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	1

Complement

1's Complement of -8: 1111 0111

2's Complement of -8: 1111 1000

1's Complement of 8: 0000 0111

2's Complement of 8: 0000 1000

1's Complement of -36: 1101 1011

2's Complement of -36: 1101 1100

1's Complement of 36: 0010 0011

2's Complement of 36: 0010 0100

Maximum negative remains unchanged

Sign bit extension

011	3
010	2
001	1
000	0
111	-1
110	-2
101	-3
100	-4

→ the most significant bits to the next bit of least significant bit set reversed turns out the negative of its value.

$$\begin{array}{r}
 0100 + 0100 = 1000 \\
 1000 + 1000 = 0000
 \end{array}$$

overflow

$$5 \rightarrow 0101 \quad 7 \rightarrow 0111 \quad 1111 \times 1111 = 111001$$

$$\begin{array}{r}
 \times \quad 1011 \leftarrow \text{multiplicand can be negative} \\
 1111011 \\
 1111011 \\
 1111011 \\
 \hline
 11011101
 \end{array}$$

$$\begin{array}{r}
 \times \quad 0101 \leftarrow \text{multiplier with sign bit set} \\
 00000101 \\
 00000000 \\
 00000000 \\
 11011 \\
 \hline
 11011101
 \end{array}$$