

$$\begin{array}{r}
 4\text{-bit} \Rightarrow 5 \quad 0101 \\
 \quad \quad \quad \quad 1010 \\
 \quad \quad \quad \quad \underline{\quad 1} \\
 -5 \leftarrow 1011
 \end{array}$$

1		
53	0101	→ 5
x 4	0100	x 4
<hr/>	<hr/>	
212	0000	
	00000	
	010100	
	<hr/>	
	010100	→ 20

bitwise manipulation

AND (&) NOT (~)

OR (|)

XOR (^)

Shifts

($\ll 2$)

0101 (5)

10100 \rightarrow 20

Shift right ($\gg 2$)

0010 \rightarrow 2

Shift left (\ll)

1011 $\gg 1$

~~010~~

0001010 \rightarrow 10

0101 \rightarrow 5

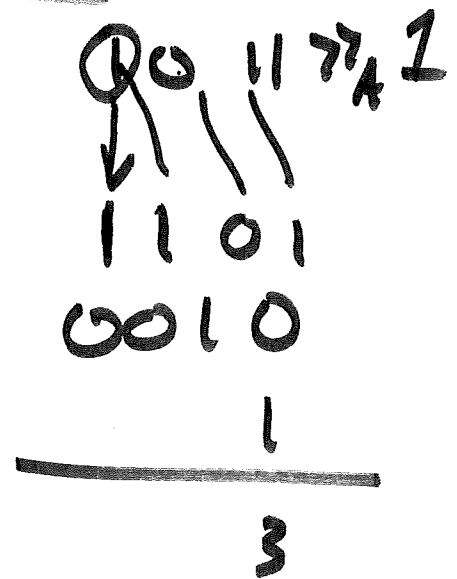
-5 (1011) $\gg 2$

5 \ll (0101) \rightarrow

~~5~~ ~~7~~ ~~2~~

~~2~~ \leftarrow

-3



0101 rot left 1

1010 2
0101

0101 rot right
1010

⁷⁻⁵
0011 4-bits
~~0000~~1011 → ~~11~~ -5

Sign extend → 2's comp

00000100
1

101 → 5

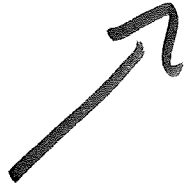
Positive ints

Negative ints

Characters

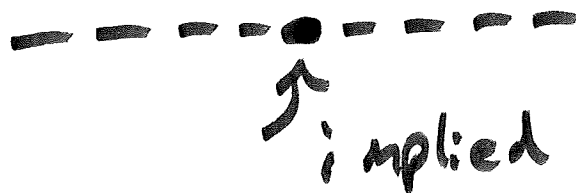
Other things?

12.345



Floating point

fixed point



floats around

atoms in mol? $\rightarrow 6.022 \cdot 10^{23}$

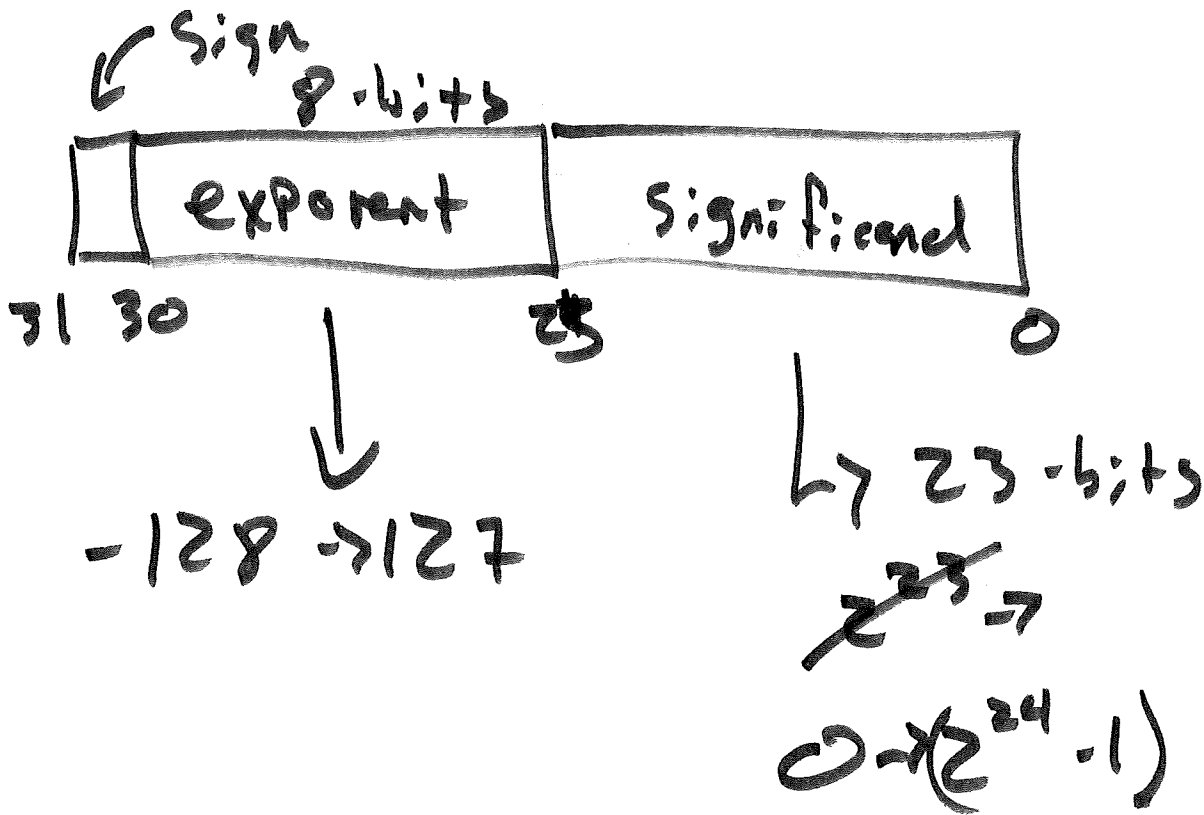
Speed of light $\rightarrow 3 \cdot 10^8$

mass of electron $\rightarrow 9.109 \cdot 10^{-31} \text{ kg}$

$\pm 6.022 \cdot 10^{23}$ \rightarrow exponent

\hookrightarrow mantissa / significand

IEEE floating point - single precision



$0.5234 \cdot 10^0$

2.101

Special cases: \rightarrow inf
NaN