

Digital Data 1/9/26

①

Representing positive integers

In our world, a number is represented by powers of 10:

$$A = 2026 = 2 \times 10^3 + 0 \times 10^2 + 2 \times 10 + 6 \times 10^0$$

$$A = a \cdot 10^3 + b \cdot 10^2 + c \cdot 10 + d$$

	Divide by 10 ↓ Q	R
A = 2026	202	6
202	20	2
20	2	0
2	0	2

In the computer world, a number is represented by powers of 2

$$A = a \cdot 2^3 + b \cdot 2^2 + c \cdot 2 + d$$

Take 35

	Division by 2	Q	R
35			
35		17	1
17		8	1
8		4	0
4		2	0
2		1	0
1		0	1

$$(35)_{10} = (100011)_2$$

Notes:

(3)

a) ☐ bit

☐☐☐☐☐☐☐☐ byte.

b) Our world $\left\{ \begin{array}{l} 1020 \\ 1021 \\ 1100 \end{array} \right.$ divisible by 10
not

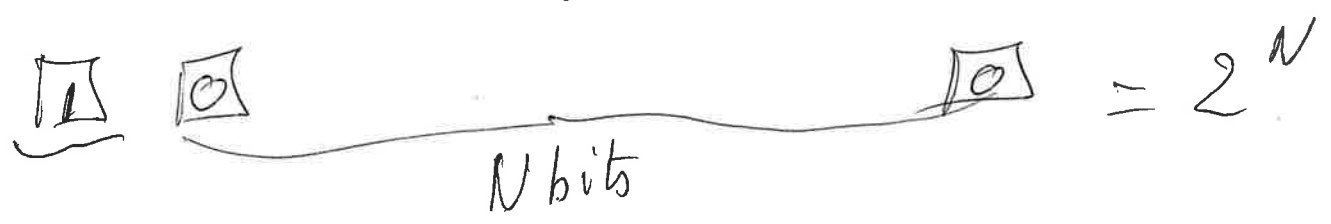
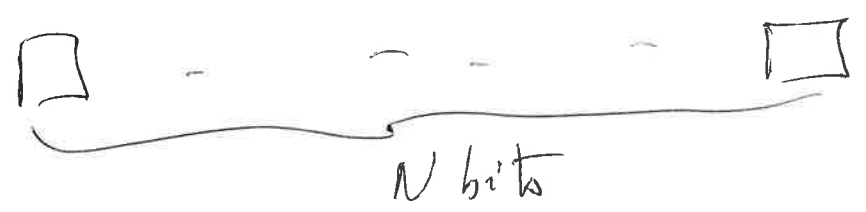
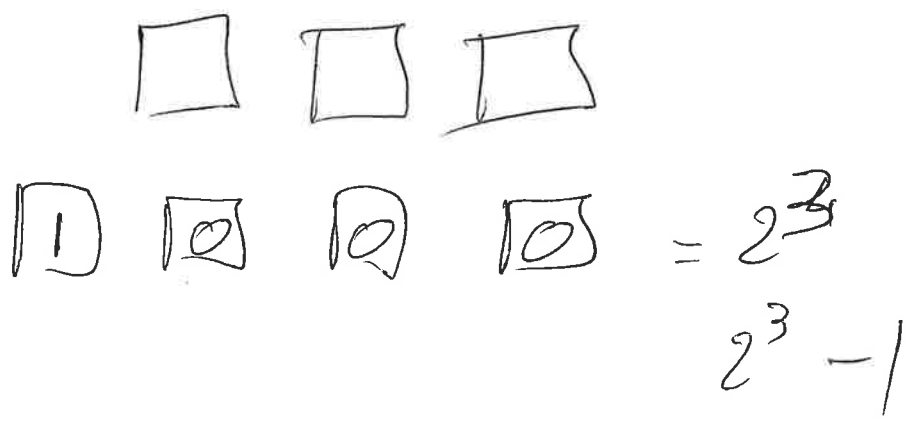
Computer : $\left\{ \begin{array}{l} \boxed{1} \boxed{1} \boxed{0} \boxed{1} \boxed{0} \\ 110100 \\ 11001000 \end{array} \right.$ divide by 2
divide by 4

c) 1 bit ☐ largest 1
of numbers 2

3 bits

$\boxed{1} \boxed{1} \boxed{1}$
 $1 \times 2^2 + 1 \times 2 + 1 = 7$

of numbers: 8



Knight's
Knives:

$$2 \times 2 \times 2 = 2^3 = 8$$

Spies

$$3 \times 3 \times 3 = 2^3 = 27$$

$$3 \quad 2 \quad 1 = 6$$