

BASE BINAIRE

1 / De la base binaire à la base décimale ★

1. Compléter les décompositions en base 2 des nombres binaires 11_2 , 101_2 , 1010_2 et 10011_2 .

$$11_2 = \dots 1 \dots \times 2^1 + \dots 1 \dots \times 2^0$$

$$1010_2 = 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$$

$$101_2 = \dots 1 \dots \times 2^2 + \dots 0 \dots \times 2^1 + \dots 1 \dots \times 2^0$$

$$10011_2 = 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

2. Convertir les nombres entiers 11_2 , 101_2 , 1010_2 et 10011_2 de la base binaire à la base décimale.

$$11_2 = \dots 3_{10} \dots$$

$$1010_2 = \dots 10_{10} \dots$$

$$101_2 = \dots 5_{10} \dots$$

$$10011_2 = \dots 19_{10} \dots$$

2 / De la base décimale à la base binaire ★★

1. Convertir les nombres entiers 4_{10} , 12_{10} et 18_{10} de la base décimale à la base binaire.

$$\begin{array}{r} 4 \mid 2 \\ 0 \mid 2 \mid 2 \\ \quad 0 \mid 1 \mid 2 \\ \quad \quad 1 \mid 0 \end{array}$$

$$4_{10} = 100_2$$

$$\begin{array}{r} 12 \mid 2 \\ 0 \mid 6 \mid 2 \\ \quad 0 \mid 3 \mid 2 \\ \quad \quad 1 \mid 1 \mid 2 \\ \quad \quad \quad 1 \mid 0 \end{array}$$

$$12_{10} = 1100_2$$

$$\begin{array}{r} 18 \mid 2 \\ 0 \mid 9 \mid 2 \\ \quad 1 \mid 4 \mid 2 \\ \quad \quad 0 \mid 2 \mid 2 \\ \quad \quad \quad 0 \mid 1 \mid 2 \\ \quad \quad \quad \quad 1 \mid 0 \end{array}$$

$$18_{10} = 10010_2$$

2. Vérifier vos résultats en convertissant les valeurs trouvées dans la base décimale.

$$100_2 = 1 \times 2^2 + 0 \times 2^1 + 0 \times 2^0 = 4_{10}$$

$$1100_2 = 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 0 \times 2^0 = 12_{10}$$

$$10010_2 = 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = 18_{10}$$

3 / Quelques conversions binaires ★★

Remplir le tableau suivant en effectuant les calculs ci-dessous.

Base 10	14_{10}	$\dots 8_{10} \dots$	20_{10}	$\dots 38_{10} \dots$	61_{10}	$\dots 148_{10} \dots$
Base 2	$\dots 1110_2 \dots$	1000_2	$\dots 10100_2 \dots$	100110_2	$\dots 111101_2 \dots$	10010100_2

$$1000_2 = 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 0 \times 2^0 = 8_{10}$$

$$100110_2 = 1 \times 2^5 + 0 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = 38_{10}$$

$$10010100_2 = 1 \times 2^7 + 0 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 0 \times 2^0 = 148_{10}$$

$$\begin{array}{r} 14 \mid 2 \\ 0 \mid 7 \mid 2 \\ \quad 1 \mid 3 \mid 2 \\ \quad \quad 1 \mid 1 \mid 2 \\ \quad \quad \quad 1 \mid 0 \end{array}$$

$$14_{10} = 1110_2$$

$$\begin{array}{r} 20 \mid 2 \\ 0 \mid 10 \mid 2 \\ \quad 0 \mid 5 \mid 2 \\ \quad \quad 1 \mid 2 \mid 2 \\ \quad \quad \quad 0 \mid 1 \mid 2 \\ \quad \quad \quad \quad 1 \mid 0 \end{array}$$

$$20_{10} = 10100_2$$

$$\begin{array}{r} 61 \mid 2 \\ 1 \mid 30 \mid 2 \\ \quad 0 \mid 15 \mid 2 \\ \quad \quad 1 \mid 7 \mid 2 \\ \quad \quad \quad 1 \mid 3 \mid 2 \\ \quad \quad \quad \quad 1 \mid 1 \mid 2 \\ \quad \quad \quad \quad \quad 1 \mid 0 \end{array}$$

$$61_{10} = 111101_2$$