



LÓGICA MATEMÁTICA

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Sistemas Numéricos

- **Base decimal**

– 0 1 2 3 4 5 6 7 8 9

- **Base binária**

– 0 1

- **Base Octal**

– 0,1,2,3,4,5,6,7

- **Base hexadecimal**

– 0 1 2 3 4 5 6 7 8 9 A B C D E F

Decimal	Binário	Octal	Hexadecimal
0	0000	0	0
1	0001	1	1
2	0010	2	2
3	0011	3	3
4	0100	4	4
5	0101	5	5
6	0110	6	6
7	0111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F

Binário
0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010
1011
1100
1101
1110
1111

p	q	r	s
V	V	V	V
V	V	V	F
V	V	F	V
V	V	F	F
V	F	V	V
V	F	V	F
V	F	F	V
V	F	F	F
F	V	V	V
F	V	V	F
F	V	F	V
F	V	F	F
F	F	V	V
F	F	V	F
F	F	F	V
F	F	F	F

V = 0

F = 1

Decimal	Binário	Octal	Hexadecimal
0	0000	0	0
1	0001	1	1
2	0010	2	2
3	0011	3	3
4	0100	4	4
5	0101	5	5
6	0110	6	6
7	0111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F


O que é um número Decimal?

Base 10

Exemplo:

$$1977 = 1.000 + 900 + 70 + 7$$

ou


$$1977 = 1 \times 10^3 + 9 \times 10^2 + 7 \times 10^1 + 7 \times 10^0$$

O que é um número Binário?

Base 2

Exemplo:

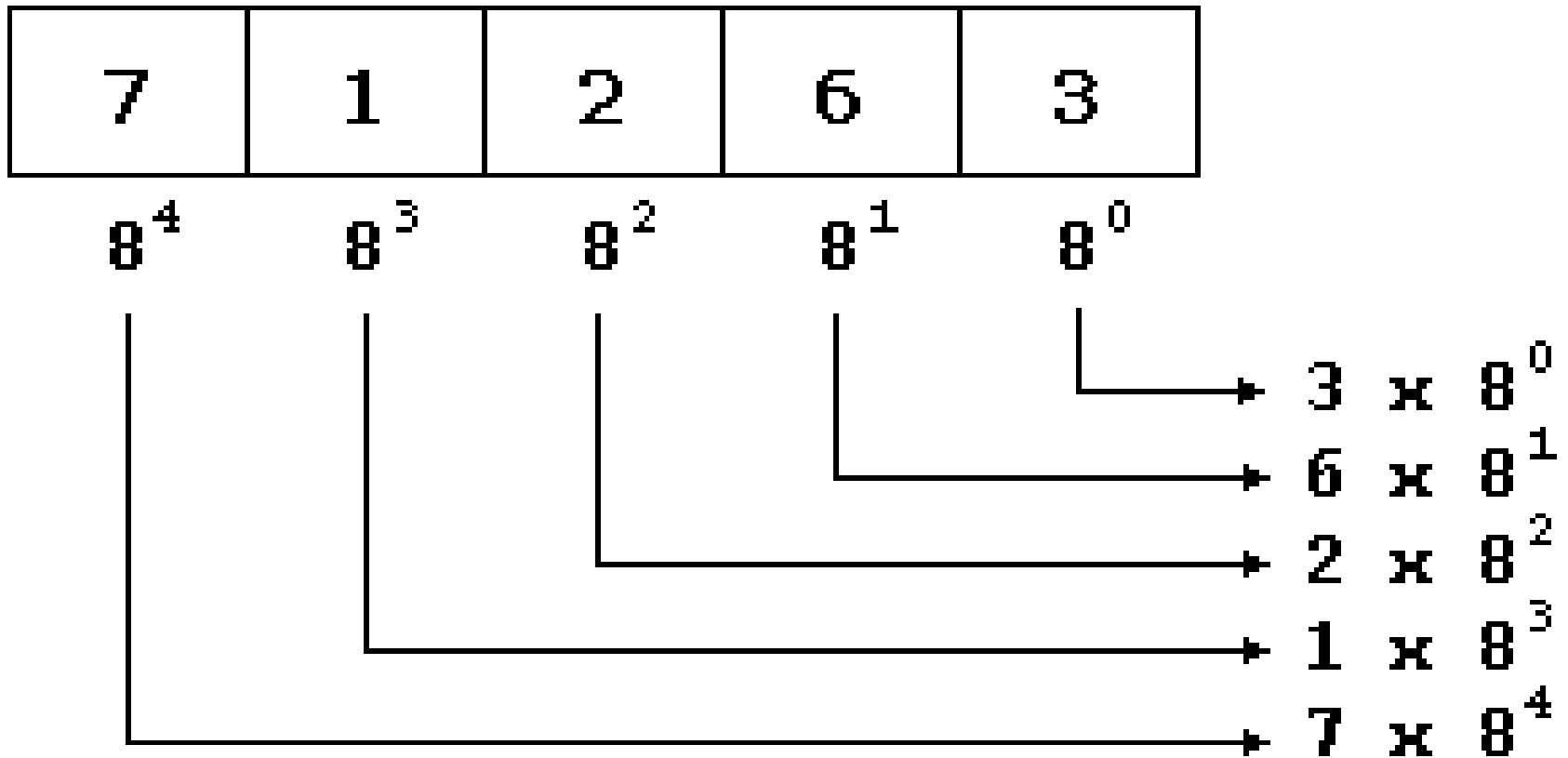
The diagram illustrates the expansion of the binary number 110101_2 into its positional value sum. The binary digits are shown in red, and the powers of 2 are in black. Arrows point from each digit to its corresponding term in the sum. A blue arrow at the bottom points to the left, indicating the direction of increasing powers of 2.

$$110101_2$$
$$1 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

O que é um número Octal?

Base 8

Exemplo:



O que é um número Hexadecimal?

Base 16

Exemplo:

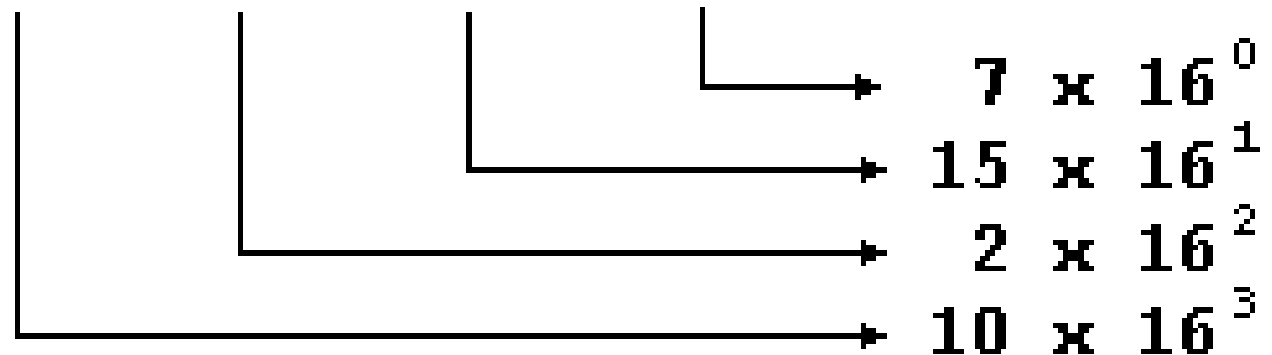
A	2	F	7
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16^3

16^2

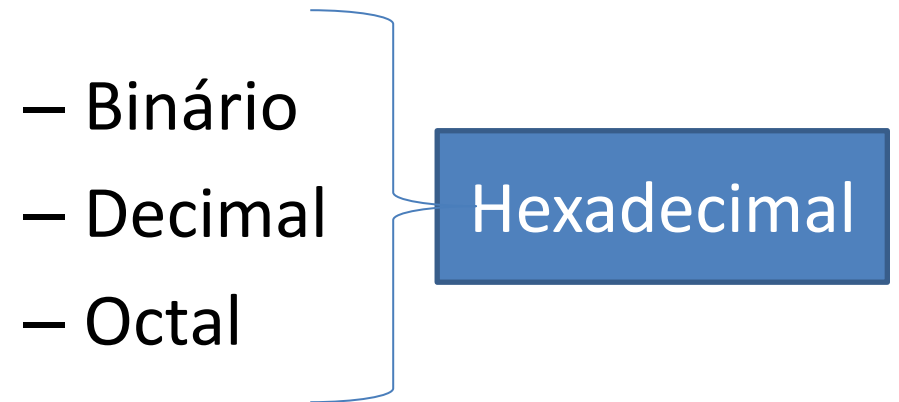
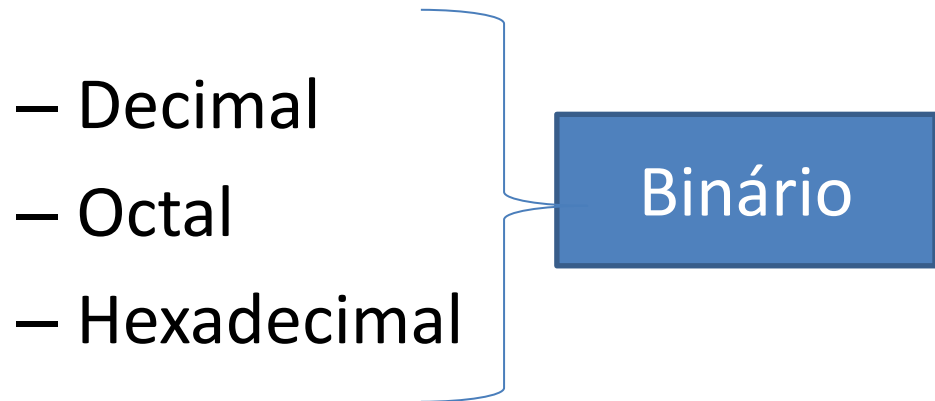
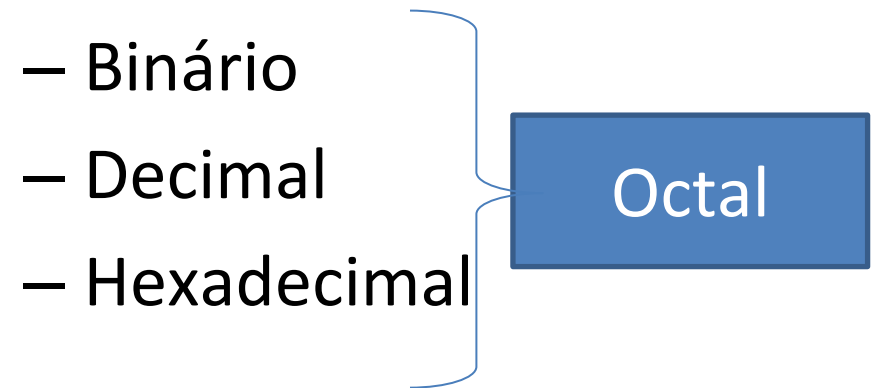
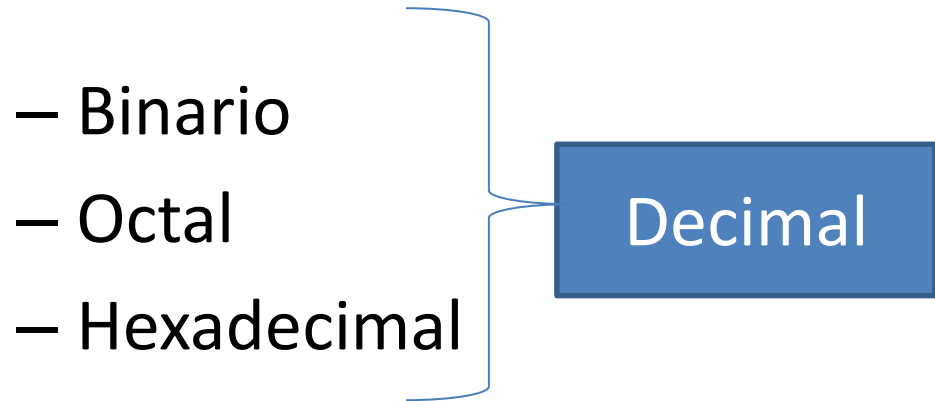
16^1

16^0



Decimal	Binário	Octal	Hexadecimal
0	0000	0	0
1	0001	1	1
2	0010	2	2
3	0011	3	3
4	0100	4	4
5	0101	5	5
6	0110	6	6
7	0111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F

Transformações



- Binario
- Octal
- Hexadecimal

Decimal

- Binário
- Decimal
- Hexadecimal

Octal

- Decimal
- Octal
- Hexadecimal

Binário

- Binário
- Decimal
- Octal

Hexadecimal

Transformações

Binário → Decimal

Binário → Decimal

Exemplo

$$\begin{array}{ccccccc} & & 1 & 1 & 0 & 1 & 0 & 1_2 \\ & \swarrow & \swarrow & \swarrow & \swarrow & \swarrow & \swarrow & \\ 1 \times 2^5 & + & 1 \times 2^4 & + & 0 \times 2^3 & + & 1 \times 2^2 & + & 0 \times 2^1 & + & 1 \times 2^0 \\ \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 32 & + & 16 & + & 0 & + & 4 & + & 0 & + & 1 = 53 \end{array}$$

qualquer número elevado à 0 = 1

Vocês!

Exemplo

111010_2

Vocês!

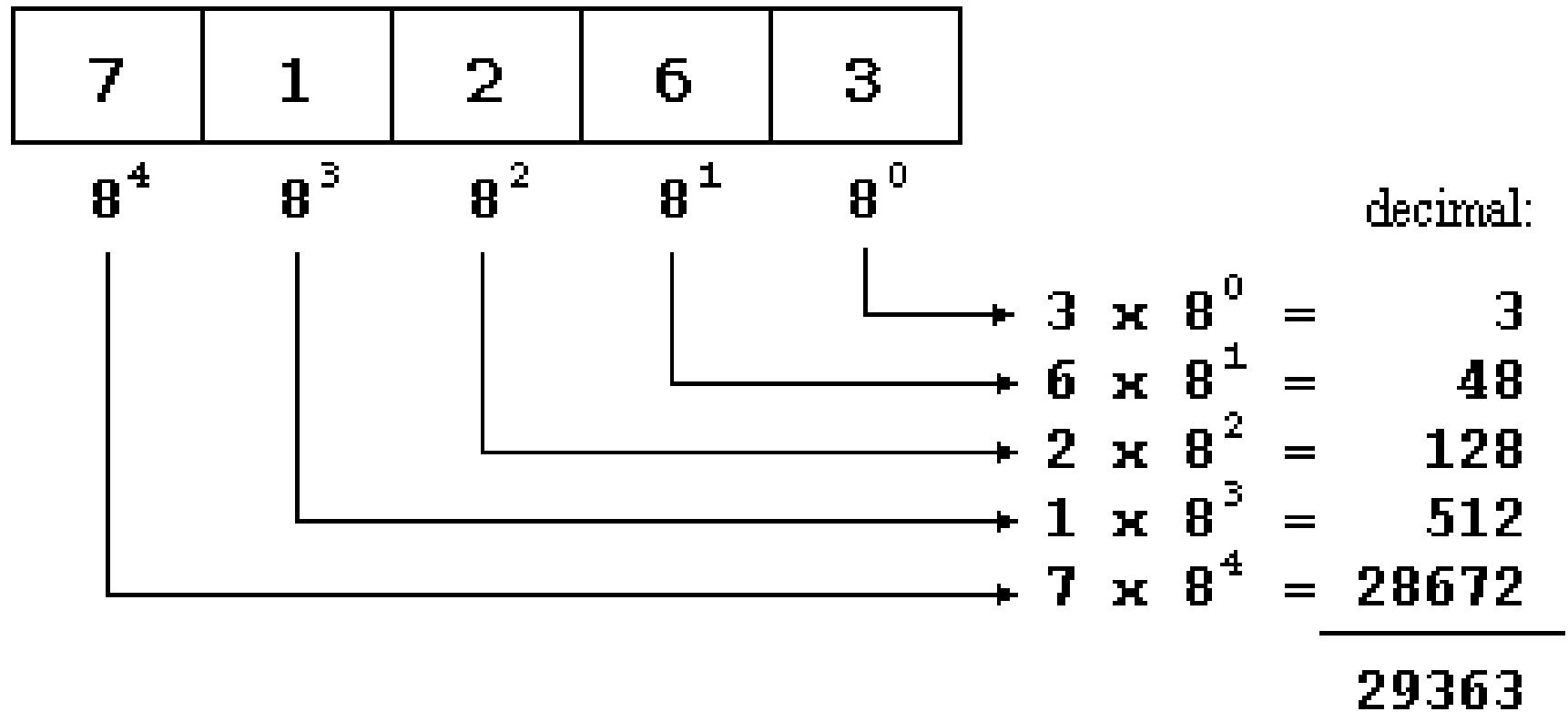
Exemplo

$$\begin{array}{c} 111010_2 \\ \swarrow \quad \swarrow \quad \swarrow \quad \swarrow \quad \swarrow \quad \swarrow \\ 1 \cdot 2^5 + 1 \cdot 2^4 + 1 \cdot 2^3 + 0 \cdot 2^2 + 1 \cdot 2^1 + 0 \cdot 2^0 \\ 32 + 16 + 8 + 0 + 2 + 0 = 58 \\ 111010_2 = 58_{10} \end{array}$$

Transformações

Octal → Decimal

Octal \rightarrow Decimal



Vocês!

3	7	2	4	6
---	---	---	---	---

Vocês!

3	7	2	4	6
---	---	---	---	---

8^4	8^3	8^2	8^1	8^0	
					$6 \times 8^0 =$
					$4 \times 8^1 =$
					$2 \times 8^2 =$
					$7 \times 8^3 =$
					$3 \times 8^4 =$
					<u>12288</u>
					16038

Octal = **37246**

Decimal = **16038**

Transformações

Hexadecimal → Decimal

Hexadecimal → Decimal

A	2	F	7
---	---	---	---

16³

 16^2

16¹

16⁰

decimal:

Diagram illustrating the expansion of the sum:

$$7 \times 16^0 + 15 \times 16^1 + 2 \times 16^2 + 10 \times 16^3 = 40960$$

41719

Vocês!

A37E

Vocês!

A37E

14	$\times 16^0 =$	14
7	$\times 16^1 =$	112
3	$\times 16^2 =$	768
10	$\times 16^3 =$	40960

Result = 41854

- Binário
- Octal
- Hexadecimal

Decimal

- Binário
- Decimal
- Hexadecimal

Octal

- Decimal
- Octal
- Hexadecimal

Binário

- Binário
- Decimal
- Octal

Hexadecimal

Dúvidas? Nota de aula 1

Exercício

Transforme os seguintes números para decimal

- *100010* (binário)
- *5422* (octal)
- *B12* (hexadecimal)

Respostas

100010 (binário)

$$\overset{5}{1} * 2^5 + \overset{4}{0} * 2^4 + \overset{3}{0} * 2^3 + \overset{2}{0} * 2^2 + \overset{1}{1} * 2^1 + \overset{0}{0} * 2^0$$

$$32 + 0 + 0 + 0 + 2 + 0$$

$$32 + 2$$

34

Respostas

5422 (octal)

$$5 * 8^3 + 4 * 8^2 + 2 * 8^1 + 2 * 8^0$$

$$5 * 512 + 4 * 64 + 2 * 8 + 2 * 1$$

$$2560 + 256 + 16 + 2$$

2834

Respostas

B12 (Hexadecimal)

$$B^{*16^2} + 1^{*16^1} + 2^{*16^0}$$

$$11 * 256 + 1 * 16 + 2 * 1$$

$$2816 + 16 + 2$$

2834