Decimal Expansions from Binary, Octal and Hexadecimal

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INTEGER PRESENTATION

- Let ***b*** be a positive integer greater than 1. Then if ***n*** is a positive integer, it can be expressed uniquely in the form:

$$n = a_k b^k + a_{k-1} b^{k-1} + \ldots + a_1 b + a_0$$

- where k is a non-negative integer, $a_0, a_1, \ldots, a_k$ are non-negative integers less than b, and $a_k \neq 0$.

$$24 = 2.10^1 + 4.10^0$$

COMMON BASES

Number	Base	Digits
Binary	2	0,1
Octal	8	0,1,2,3,4,5,6,7
Decimal	10	0,1,2,3,4,5,6,7,8,9
Hexadecimal	16	0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F

DECIMAL EXPANSION OF 12,625

Decimal Expansion

$$(12{,}625)_{10} = 1 \cdot 10^4 + 2 \cdot 10^3 + 6 \cdot 10^2 + 2 \cdot 10^1 + 5 \cdot 10^0$$

BINARY TO DECIMAL EXPANSION

Binary to decimal

$$(1\,0\,1\,0\,1)_2 = 1 \cdot 2^4 + 0 \cdot 2^3 + 1 \cdot 2^2 + 0 \cdot 2^1 + 1 \cdot 2^0$$
$$= 16 + 0 + 4 + 0 + 1$$
$$= 21$$

Decimal Expansion

$$21 = 2 \cdot 10^1 + 1 \cdot 10^0$$

OCTAL TO DECIMAL EXPANSION

Octal to decimal

$$(2470)_8 = 2 \cdot 8^3 + 4 \cdot 8^2 + 7 \cdot 8^1 + 0 \cdot 8^0$$
$$= 1024 + 256 + 56 + 0$$
$$= 1{,}336$$

Decimal Expansion

$$1336 = 1 \cdot 10^3 + 3 \cdot 10^2 + 3 \cdot 10^1 + 6 \cdot 10^0$$

HEXA-DECIMAL TO DECIMAL EXPANSION

Hexa-Decimal to decimal

$$(2AB)_{16} = 2 \cdot 16^2 + 10 \cdot 16^1 + 11 \cdot 16^0$$
$$= 512 + 160 + 11$$
$$= 683$$

Decimal Expansion

$$683 = 6 \cdot 10^2 + 8 \cdot 10^1 + 3 \cdot 10^0$$

Thank You!