SISTEM BILANGAN

Decimal (Base 10)	*Binary (Base 2)*	*Octal (Base 8)*	*Hexadecimal (Base 16)*
0	0	0	0
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	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

Convert the binary number $(1101.101)_2$ to its decimal equivalent.

Solution:

$$(1101.101)_2 = 1\times2^3 + 1\times2^2 + 0\times2^1 + 1\times2^0 + 1\times2^{-1} + 0\times2^{-2} + 1\times2^{-3}$$
$$= 8 + 4 + 0 + 1 + 0.5 + 0 + 0.125 = (13.625)_{10}$$

Convert the octal number $(540.6)_8$ to its decimal equivalent.

Solution:

$$(540.6)_8 = 5\times8^2 + 4\times8^1 + 0\times8^0 + 6\times8^{-1}$$
$$= 5\times64 + 4\times8 + 0\times1 + 6\times8^{-1} = (352.75)_{10}$$

Convert the hexadecimal number $(DB0.A)_{16}$ to its decimal equivalent.

Solution:

$$(DB0.A)_{16} = D\times16^2 + B\times16^1 + 0\times16^0 + A\times16^{-1}$$
$$= 13\times256 + 11\times16 + 0\times1 + 10\times16^{-1} = (3,504.625)_{10}$$

Convert the decimal number $(39)_{10}$ to its binary equivalent.

Solution:

$39/2 = \text{Quotient } 19 + \text{Remainder } 1 \text{ (lsb)}$

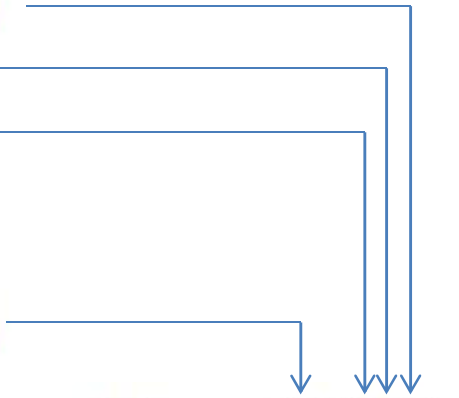
$19/2 = \text{Quotient } 9 + \text{Remainder } 1$

$9/2 = \text{Quotient } 4 + \text{Remainder } 1$

$4/2 = \text{Quotient } 2 + \text{Remainder } 0$

$2/2 = \text{Quotient } 1 + \text{Remainder } 0$

$1/2 = \text{Quotient } 0 + \text{Remainder } 1 \text{ (msb)}$



$$(39)_{10} = (100111)_2$$

Convert the decimal number $(0.39654)_{10}$ to its binary equivalent.

Solution:

$0.39654 \times 2 = 0.79308 = \mathbf{0}$ (msb of binary number) $+ 0.79308$

$0.79308 \times 2 = 1.58616 = \mathbf{1}$ (next binary digit) $+ 0.58616$

$0.58616 \times 2 = 1.17232 = \mathbf{1} + 0.17232$

$0.17232 \times 2 = 0.34464 = \mathbf{0} + 0.34464$

and so on

$$(0.39654)_{10} = (0.0110\ldots)_2$$

Convert the decimal number $(0.84375)_{10}$ to its binary equivalent.

Solution:

$0.84375 \times 2 = 1.6875 = \mathbf{1}$ (msb of binary number) $+ 0.6875$

$0.6875 \times 2 = 1.375 = \mathbf{1}$ (next binary digit) $+ 0.375$

$0.375 \times 2 = 0.75 = \mathbf{0} + 0.75$

$0.75 \times 2 = 1.5 = \mathbf{1} + 0.5$

$0.5 \times 2 = 1.0 = \mathbf{1}$ (lsb) $+ 0.0$

$$(0.84375)_{10} = (0.11011)_2$$

For this example, the conversion is exact; this is because

$$(0.84375)_{10} = (0.11011)_2 = 1\times 2^{-1} + 1\times 2^{-2} + 0\times 2^{-3} + 1\times 2^{-4} + 1\times 2^{-5}$$

Convert the decimal number $(39.84375)_{10}$ to its binary equivalent.

Solution:

$$(39)_{10} = (100111)_2$$
$$(0.84375)_{10} = (0.11011)_2$$
$$(39.84375)_{10} = (100111.11011)_2$$

Convert the decimal number $(389.125)_{10}$ to its hexadecimal equivalent.

Solution:

389/16 = Quotient 24 + Remainder 5 (lsb)
24/16 = Quotient 1 + Remainder 8
1/16 = Quotient 0 + Remainder 1 (msb)

$0.125 \times 16 = 2.0 =$ **2** (msb of fractional part) + 0.0

$$(389.125)_{10} = (185.2)_{16}$$