number systems → decimal number system

Base 10 → 10 unique digit.
↳ 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

0 → 0
1 → 1
2 → 2
3 → 3
4 → 4
5 → 5
6 → 6
7 → 7
8 → 8
9 → 9
10 → . . .

① Binary number system → Base 2.

0 → 0 Bits → 0 → 0000 → 0000
1 → 1 Bit → 0+1 → 0001 → 0001
2 → 2 Bits → 1+0 → 0010 → 0010
3 → 2 Bits → 1+1 → 0011 → 0011
4 → 3 Bits → 2+0 → 0100 → 0100
5 → 3 Bits → 2+1 → 0101 → 0101
6 → 3 Bits → 2+2 → 0110 → 0110
7 → 3 Bits → 2+2+1 → 0111 → 0111
8 → 4 Bits → 4+0 → 1000 → 1000
9 → 4 Bits → 4+1 → 1001 → 1001
10 → 4 Bits → 4+2 → 1010 → 1010
11 → 4 Bits → 4+2+1 → 1011 → 1011
12 → 4 Bits → 4+2+2 → 1100 → 1100
13 → 4 Bits → 4+2+2+1 → 1101 → 1101
14 → 4 Bits → 4+2+2+2 → 1110 → 1110
15 → 4 Bits → 4+2+2+2+1 → 1111 → 1111
16 → 5 Bits → 8+2+2+2+2 → 10000 → 10000
17 → 5 Bits → 8+2+2+2+2+1 → 10001 → 10001
18 → 5 Bits → 8+2+2+2+2+2 → 10010 → 10010
19 → 5 Bits → 8+2+2+2+2+2+1 → 10011 → 10011
20 → 5 Bits → 8+2+2+2+2+2+2 → 10100 → 10100
21 → 5 Bits → 8+2+2+2+2+2+2+1 → 10101 → 10101
22 → 5 Bits → 8+2+2+2+2+2+2+2 → 10110 → 10110
23 → 5 Bits → 8+2+2+2+2+2+2+2+1 → 10111 → 10111

Bits → _ _ _ _ _ _ _ _ → 1 Byte.

n-bits → 2^n digits → $2^8 \to 256$ digits.

0
1 → $2^1 \to 2$.

0
1
0 0
0 1
1 0
1 1 → $2^2 \to 4$ unique digit.

1 1 1 1 1 1 1 1 → $2^8 - 1 = 255$

largest Binary digit
0 → 1 1 → $2^8 - 1 \to$ ①
1 → $2^1 - 1 \to$ ①
0-255 → 256 numbers.

Conversions → $(32)_{10} \to (?)_2$

	32		
2	16	0×2^0	↑
2	8	0×2^1	last
2	4	0×2^2	bits
2	2	0×2^3	
2	1	0×2^4	
	0	1×2^5	↓

100000 → 0 × 0 × 0 × 0 × 0 × 0
→ $(100000)_2$.

Binary to decimal → $(100000)_2 \to (?)_{10}$

1	100000	0×2^0	$\times 0$
1	10000	0×2^1	$\times 0$
1	1000	0×2^2	$\times 0$
1	100	0×2^3	$\times 0$
1	10	0×2^4	$\times 0$
1	1	1×2^5	$\times 32$
	0		

$\to (32)_{10}$

* Octal Number System → Base 8.
↳ 0, 1, 2, 3, 4, 5, 6, 7.

0 → 0
1 → 1
2 → 2
3 → 3
4 → 4
5 → 5
6 → 6
7 → 7
8 → 10
9 → 11
10 → 12
. . .
23 → 23

23

Q→ $(32)_8 \to (?)_{10}$
↳ $(?)_{10} \to (?)_{10}$

8	32	2×8^0
8	3	3×8^1
	0	

$\to (26)_{10}$

(?)$_8$ → (?)$_2$

2	26	$\times 2^0$
2	13	$\times 2^1$
	0	

$\to (32)_2$

Q→ $(?)_8 \to (?)_{10}$.
↳ $(?)_8 \to (?)_2$
↳ $(?)_2 \to (?)_{10}$

Data → types

Primitive (Stack)
① Byte
② short
③ int
④ long
⑤ float
⑥ double
⑦ boolean } true/false
⑧ char } → character

Non-Primitive (Heap)
→ 8 bits in 1 byte → -2^8 to $2^8 - 1$ → -128 to 127
→ 16 bits multiples → -2^{16} to $2^{16}-1$
→ 32 bits in 1 byte → -2^{32} to $2^{32}-1$ → -10^9 to 10^9
→ 64 bits in 1 byte → -2^{64} to $2^{64}-1$.

} → integer.
} → decimal

int a = 32; → literal

byte
short
long
int } → integer.

byte b = 10;
short s = 10;
int on = 10;
long ln = 10;

b = 1n;
s = ln;
ln = b;
on = s;
on = b;
ln = s;

} → ✗

int a = 10;
byte b = a;
b = a;
int a = b;
int a = s;
int a = ln;

byte b = 10; → literal
→ -128 to 127
1 byte
byte b = 1;
→ implicit byte cast.

b = in;

00000010 → b
8 bits
int in = 10;
byte b = 10;
1 byte
→ int → 4 byte

byte b = (128); → implicit
1 byte.
4 byte

b =
7 6 5 4 3 2 1 0
1 0 0 0 0 0 0 0
8 bits
M.S.B

sys.o(b) => -128

byte b = 128 → system.

(128) => ✗

Resume back at 9:00 Pm

char ch = 'a';

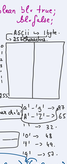
sys.o(ch) → ②

ch = 99; → implicit
→ 01000
'c'
sys.o(ch) => c.

ch, ch + 2 =>
char
char
int
int

Boolean b1 = true;
b1 = false;

b1 = 33 → byte.



char ch = 'a' → '0' → 48 to 122
'A' → '97' → 65 to 90.
'a' → 97
'A' → 65
'0' → 48
'9' → 57
'a' → 97
'z' → 122

ch = (char) (ch + 2);
ch = 'c'

char c = (char) 99;
→ char c = 'c';

Boolean b1 = true;
b1 = false;

char ch = 'a';
→ byte → char.
2^8 → 65536 u
Character.toUpper
→ UNICODE
→ 216 characters
0-255 → ASCII

Q→ Convert Fahrenheit to Celcius?

int main = 0
int max = 300.
int step = 20.

F	C
0	-17
20	—
40	—
60	—
80	—
300	—

C = (5/9) * (F - 32)

C = 5/9 * F - 32

Q→ Write a program to Convert Decimal to Binary?

public static void main (String[] args){
int dec = 32;
int temporary = 1 → // 10^0
int bin = 0;
while (dec != 0) {
int rem = dec % 2 →
bin = bin + rem temporary;
temporary = temporary * 10; // 100000
dec = dec/2; // 16
1/2 = 0

32
2 | 32 → 0
2 | 16 → 0 × 10^0
2 | 8 → 0 × 10^1
2 | 4 → 0 × 10^2
2 | 2 → 0 × 10^3
2 | 1 → 1 × 10^4
0

0 + 0 × 10^0 + 0 × 10^1 + 0 × 10^2 + 0 × 10^3 + 0 × 10^4 + 1 × 10^5
↳ (100000)_2

1%2
=

↳ functions
↳ Arrays

↳ Arrays
Basics, Syntax
Index, Continual declaration
Array syntax, Array Usage
use Array in memory
variable Syntax

byte b = (32) → byte(b) = 32

byte b = 128 → byte(b) = -128

8 6 5 4 3 2 1 0
0 0 0 0 0 0 0 0
32 bits
1 byte
byte(b)

-ve number.
1 0 0 0 0 0 0 0
2's
0 1 1 1 1 1 1 1
1's
1 0 0 0 0 0 0 0
2's
→ decimal = -128

-128

ch = 99;
ch = (ch + 2);
(character + integer)
integer
4 bytes
ch = (char) (ch + 2);