

ASCII Conversion Reference

Decimal · Hexadecimal · Binary · Character · Control codes · Key relationships

Control Characters (0x00 – 0x1F) — non-printing

Dec	Hex	Binary	Abbr	Meaning
0	00	0000 0000	NUL	Null
1	01	0000 0001	SOH	Start of Heading
2	02	0000 0010	STX	Start of Text
3	03	0000 0011	ETX	End of Text
4	04	0000 0100	EOT	End of Transmission
5	05	0000 0101	ENQ	Enquiry
6	06	0000 0110	ACK	Acknowledge
7	07	0000 0111	BEL	Bell (Ctrl+G)
8	08	0000 1000	BS	Backspace (Ctrl+H)
9	09	0000 1001	HT	Horizontal Tab (Ctrl+I)
10	0A	0000 1010	LF	Line Feed (Ctrl+J)
11	0B	0000 1011	VT	Vertical Tab (Ctrl+K)
12	0C	0000 1100	FF	Form Feed (Ctrl+L)
13	0D	0000 1101	CR	Carriage Return (Ctrl+M)
14	0E	0000 1110	SO	Shift Out
15	0F	0000 1111	SI	Shift In

Dec	Hex	Binary	Abbr	Meaning
16	10	0001 0000	DLE	Data Link Escape
17	11	0001 0001	DC1	Device Control 1 (XON)
18	12	0001 0010	DC2	Device Control 2
19	13	0001 0011	DC3	Device Control 3 (XOFF)
20	14	0001 0100	DC4	Device Control 4
21	15	0001 0101	NAK	Negative Acknowledge
22	16	0001 0110	SYN	Synchronous Idle
23	17	0001 0111	ETB	End of Transmission Block
24	18	0001 1000	CAN	Cancel
25	19	0001 1001	EM	End of Medium
26	1A	0001 1010	SUB	Substitute
27	1B	0001 1011	ESC	Escape (Ctrl+[)
28	1C	0001 1100	FS	File Separator
29	1D	0001 1101	GS	Group Separator
30	1E	0001 1110	RS	Record Separator
31	1F	0001 1111	US	Unit Separator

Printable Characters (0x20 – 0x7F)

Dec	Hex	Bin	Ch
32	20	010 0000	SPC
33	21	010 0001	!
34	22	010 0010	"
35	23	010 0011	#
36	24	010 0100	\$
37	25	010 0101	%
38	26	010 0110	&
39	27	010 0111	'
40	28	010 1000	(
41	29	010 1001)
42	2A	010 1010	*
43	2B	010 1011	+
44	2C	010 1100	,
45	2D	010 1101	-
46	2E	010 1110	.

Dec	Hex	Bin	Ch
64	40	100 0000	@
65	41	100 0001	A
66	42	100 0010	B
67	43	100 0011	C
68	44	100 0100	D
69	45	100 0101	E
70	46	100 0110	F
71	47	100 0111	G
72	48	100 1000	H
73	49	100 1001	I
74	4A	100 1010	J
75	4B	100 1011	K
76	4C	100 1100	L
77	4D	100 1101	M
78	4E	100 1110	N

Dec	Hex	Bin	Ch
96	60	110 0000	`
97	61	110 0001	a
98	62	110 0010	b
99	63	110 0011	c
100	64	110 0100	d
101	65	110 0101	e
102	66	110 0110	f
103	67	110 0111	g
104	68	110 1000	h
105	69	110 1001	i
106	6A	110 1010	j
107	6B	110 1011	k
108	6C	110 1100	l
109	6D	110 1101	m
110	6E	110 1110	n

Key Relationships

Digits 0–9:

Hex 0x30–0x39

To digit: char AND 0x0F

To ASCII: digit OR 0x30

A–Z: 0x41–0x5A

a–z: 0x61–0x7A

Differ by **bit 5** only:

0x20 = 0010 0000

Upper→lower:

char OR 0x20

Lower→upper:

char AND 0xDF

Toggle case:

char XOR 0x20

Control Char Trick

Ctrl+key = key code

AND 0x1F

e.g. Ctrl+G:

'G'=0x47

0x47 AND 0x1F

0x07 = BEL

47	2F	010 1111	/
48	30	011 0000	0
49	31	011 0001	1
50	32	011 0010	2
51	33	011 0011	3
52	34	011 0100	4
53	35	011 0101	5
54	36	011 0110	6
55	37	011 0111	7
56	38	011 1000	8
57	39	011 1001	9
58	3A	011 1010	:
59	3B	011 1011	;
60	3C	011 1100	<
61	3D	011 1101	=
62	3E	011 1110	>
63	3F	011 1111	?

79	4F	100 1111	O
80	50	101 0000	P
81	51	101 0001	Q
82	52	101 0010	R
83	53	101 0011	S
84	54	101 0100	T
85	55	101 0101	U
86	56	101 0110	V
87	57	101 0111	W
88	58	101 1000	X
89	59	101 1001	Y
90	5A	101 1010	Z
91	5B	101 1011	[
92	5C	101 1100	\
93	5D	101 1101]
94	5E	101 1110	^
95	5F	101 1111	_

111	6F	110 1111	o
112	70	111 0000	p
113	71	111 0001	q
114	72	111 0010	r
115	73	111 0011	s
116	74	111 0100	t
117	75	111 0101	u
118	76	111 0110	v
119	77	111 0111	w
120	78	111 1000	x
121	79	111 1001	y
122	7A	111 1010	z
123	7B	111 1011	{
124	7C	111 1100	
125	7D	111 1101	}
126	7E	111 1110	~
127	7F	111 1111	DEL

Range Summary

Hex	Contents
00-1F	Control chars
20-2F	Punctuation
30-39	0 – 9
3A-40	Punctuation
41-5A	A – Z
5B-60	Punctuation
61-7A	a – z
7B-7E	Punctuation
7F	DEL

ASCII (American Standard Code for Information Interchange) · 7-bit code · 128 characters (0-127) · High bit always 0 in standard ASCII