Character Sets – ASCII - Reading

Computers only store 0s and 1s. Humans, though, want to read and write with letters of the alphabet. We therefore need a way of converting letters, known as **characters**, into binary.

To do this we use a **character set**. This is a set of characters along with the binary code that represents each one.

A common character set is **ASCII**, pronounced ASS-KEY. It stands for **American Standard Code for Information Interchange**. ASCII was developed in the late 1960s and so many of the characters are obsolete today. It uses 7 bits to encode up to 128 characters (from 0~127). **Extended ASCII uses 8 bits** (1 byte) to encode up to 256 characters (from 0~255).

The following table shows some of the ASCII and extended ASCII character set.

ASCII from 32~111

Binary	Char	Binary	Char	Binary	Char	Binary	Char	Binary	Char
0010 0000	Space	0011 0000	0	0100 0000	@	0101 0000	P	0110 0000	`
0010 0001	!	0011 0001	1	0100 0001	A	0101 0001	Q	0110 0001	a
0010 0010	"	0011 0010	2	0100 0010	B	0101 0010	R	0110 0010	b
0010 0011	#	0011 0011	3	0100 0011	C	0101 0011	S	0110 0011	c
0010 0100	$	0011 0100	4	0100 0100	D	0101 0100	T	0110 0100	d
0010 0101	%	0011 0101	5	0100 0101	E	0101 0101	U	0110 0101	e
0010 0110	&	0011 0110	6	0100 0110	F	0101 0110	V	0110 0110	f
0010 0111	'	0011 0111	7	0100 0111	G	0101 0111	W	0110 0111	g
0010 1000	(	0011 1000	8	0100 1000	H	0101 1000	X	0110 1000	h
0010 1001	)	0011 1001	9	0100 1001	I	0101 1001	Y	0110 1001	i
0010 1010	*	0011 1010	:	0100 1010	J	0101 1010	Z	0110 1010	j
0010 1011	+	0011 1011	;	0100 1011	K	0101 1011	[	0110 1011	k
0010 1100	,	0011 1100	<	0100 1100	L	0101 1100	\	0110 1100	l
0010 1101	-	0011 1101	=	0100 1101	M	0101 1101	]	0110 1101	m
0010 1110	.	0011 1110	>	0100 1110	N	0101 1110	^	0110 1110	n
0010 1111	/	0011 1111	?	0100 1111	O	0101 1111		0110 1111	o

ASCII from 112~127

Binary	Char
0111 0000	p
0111 0001	q
0111 0010	r
0111 0011	s
0111 0100	t
0111 0101	u
0111 0110	v
0111 0111	w
0111 1000	x
0111 1001	y
0111 1010	z
0111 1011	{
0111 1100	|
0111 1101	}
0111 1110	~
0111 1111	DEL

Extended ASCII from 232~247

Binary	Char
1110 1000	è
1110 1001	é
1110 1010	ê
1110 1011	ë
1110 1100	ì
1110 1101	í
1110 1110	î
1110 1111	ï
1111 0000	ð
1111 0001	ñ
1111 0010	ò
1111 0011	ó
1111 0100	ô
1111 0101	õ
1111 0110	ö
1111 0111	÷

Notice that uppercase letters have a lower binary number than lowercase letters. This means that in programming it is often true to say that A < a or c < d.

Question: What is the binary value of "K" in ASCII? Answer: **0100 1011**

Question: Convert "Happy Birthday!" into binary using ASCII.

Answer: **01001000 01100001 01110000 01110000 01111001 00100000 01000010 01101001 01110010 01110100 01101000 01100100 01100001 01111001 00100001**

(The spaces here would not be stored by the computer, it would just be one long sequence of 0s and 1s)