

ASCII reference

Each character has a number (its *ASCII code*). Use this table wherever a question asks you to decode a message.

0	NUL	16	DLE	32	SP	48	0	64	@	80	P	96	`	112	p
1	SOH	17	DC1	33	!	49	1	65	A	81	Q	97	a	113	q
2	STX	18	DC2	34	"	50	2	66	B	82	R	98	b	114	r
3	ETX	19	DC3	35	#	51	3	67	C	83	S	99	c	115	s
4	EOT	20	DC4	36	\$	52	4	68	D	84	T	100	d	116	t
5	ENQ	21	NAK	37	%	53	5	69	E	85	U	101	e	117	u
6	ACK	22	SYN	38	&	54	6	70	F	86	V	102	f	118	v
7	BEL	23	ETB	39	'	55	7	71	G	87	W	103	g	119	w
8	BS	24	CAN	40	(	56	8	72	H	88	X	104	h	120	x
9	HT	25	EM	41	)	57	9	73	I	89	Y	105	i	121	y
10	LF	26	SUB	42	*	58	:	74	J	90	Z	106	j	122	z
11	VT	27	ESC	43	+	59	;	75	K	91	[	107	k	123	{
12	FF	28	FS	44	,	60	<	76	L	92	\	108	l	124	
13	CR	29	GS	45	-	61	=	77	M	93	]	109	m	125	}
14	SO	30	RS	46	.	62	>	78	N	94	^	110	n	126	~
15	SI	31	US	47	/	63	?	79	O	95	_	111	o	127	DEL

Problem 1.

Convert each binary number to decimal:

$1011_2 =$ _____

$1100_2 =$ _____

$0111_2 =$ _____

$1010_2 =$ _____

Hint: the four place values are 8, 4, 2, 1. Add up the place values wherever there is a 1.

Problem 2.

Convert each binary number to decimal:

$10010_2 =$ _____

$100000_2 =$ _____

$111111_2 =$ _____

$101101_2 =$ _____

Problem 3.

Convert each binary number to decimal:

$$01000001_2 = \underline{\hspace{2cm}}$$

$$00101010_2 = \underline{\hspace{2cm}}$$

$$10000000_2 = \underline{\hspace{2cm}}$$

$$11111111_2 = \underline{\hspace{2cm}}$$

With 8 bits the place values are 128, 64, 32, 16, 8, 4, 2, 1.

Problem 4.

Convert each decimal number to binary:

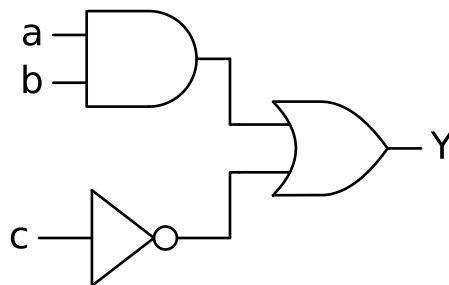
$$6 = \underline{\hspace{2cm}}$$

$$19 = \underline{\hspace{2cm}}$$

$$42 = \underline{\hspace{2cm}}$$

$$100 = \underline{\hspace{2cm}}$$

Hint: find the largest place value (... , 32, 16, 8, 4, 2, 1) that fits, subtract it, and repeat with what's left.

Problem 5.

Write the Boolean expression for output Y , then draw its truth table.

Problem 6.

The digit characters 0–9 are NOT the same as the numbers 0–9 — each has its own ASCII code.

Each character of a secret message has been written as its ASCII code in 8-bit binary. Convert each code to decimal, then use the ASCII table on the first page to decode the message.

binary	01000011	01010011	00110001	00110111
decimal				
letter				

Message: _____

Problem 7.

Decode the secret word. Watch the capitalisation — uppercase and lowercase letters have different codes.

Each character of a secret message has been written as its ASCII code in 8-bit binary. Convert each code to decimal, then use the ASCII table on the first page to decode the message.

binary	01100010	01101001	01101110	01100001	01110010	01111001
decimal						
letter						

Message: _____

Problem 8.

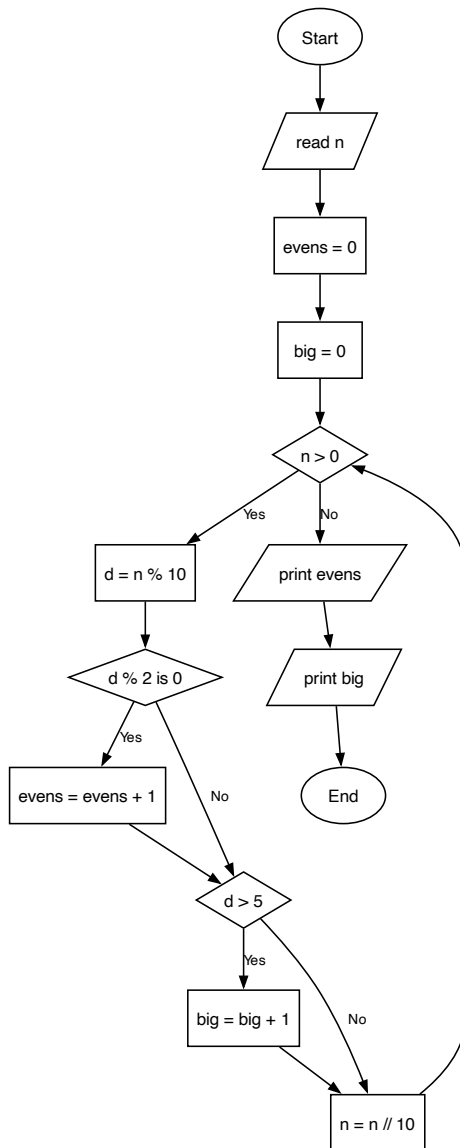
Draw the truth table for:

$$Y = A \oplus B \cdot C$$

Problem 9.

Trace this algorithm for $n = 6391$, and complete the trace table.

Reminder: $n \% 10$ is the last digit of n , and $n // 10$ removes it (e.g. $6391 \% 10 = 1$ and $6391 // 10 = 639$).

[illegible]