

# PORTABLE COMPUTER WORLD

Hex Byte	Displayed Form	Meaning	Hex Byte	Displayed Form	Meaning	Hex Byte	Displayed Form	Meaning	Hex Byte	Displayed Form	Meaning
00	00	end of line (Basic)	4A	.4	.	A1	1.	COS	D8	8¥	GOSUB
11	11	SPC (space code)	4B	E4	E	A2	2.	TAN	D9	9¥	CHAIN
12	21	"	51	15	A	A3	3.	ASN	DA	.¥	PAUSE
13	31	?	52	25	B	A4	4.	ACS	DB	E¥	BEEP
14	41	!	53	35	C	A5	5.	ATN	DC	%¥	AREAD
15	51	#	54	45	D	A6	6.	EXP	DD	¥¥	USING
16	61	%	55	55	E	A7	7.	LN	DE	\$¥	RETURN
17	71	¥	56	65	F	A8	8.	LOG			
18	81	\$	57	75	G	A9	9.	INT			
19	91	π	58	85	H	AA	..	ABS			
1A	.1	√	59	95	I	AB	E.	SGN			
1B	E1	'	5A	.5	J	AC	%.¥	DEG			
1C	%1	:	5B	E5	K	AD	¥.	DMS	HEX		DISPLAY
1D	¥1	:	5C	%5	L	B0	0E	RUN	A .....		(DEC.PT)
30	03	(	5D	¥5	M	B1	1E	NEW	B.....		E
31	13	)	5E	\$5	N	B2	2E	MEM	C.....		%
32	23	>	5F	π5	O	B3	3E	LIST	D.....		¥
33	33	<	60	06	P	B4	4E	CONT	E.....		\$
34	43	=	61	16	Q	B5	5E	DEBUG	F.....		π
35	53	+	62	26	R	B6	6E	CSAVE			
36	63	-	63	36	S	B7	7E	CLOAD			
37	73	*	64	46	T	C0	0%	GRAD			
38	83	/	65	56	U	C1	1%	PRINT			
39	93	>	66	66	V	C2	2%	INPUT			
3A	(.3)	[ ]	67	76	W	C3	3%	RADIAN			
40	04	0	68	86	X	C4	4%	DEGREE			
41	14	1	69	96	Y	C5	5%	CLEAR			
42	24	2	6A	.6	Z	D0	0¥	IF	PRINT USING		These commands are represented by two consecutive bytes. For instance, PRINT USING is C1 followed by DD.
43	34	3	82	28	>=	D1	1¥	FOR	IF		
44	44	4	83	38	<=	D2	2¥	LET	FOR		
45	54	5	84	48	<>	D3	3¥	REM	INPUT#		
46	64	6	90	09	TO	D4	4¥	END	CLOAD?		
47	74	7	91	19	STEP	D5	5¥	NEXT			
48	84	8	92	29	THEN	D6	6¥	STOP			
49	94	9	A0	0.	SIN	D7	7¥	GOTO			

Tandy Pocket Computer/Sharp PC1211 code listing.

## HOW LUCKY ARE LUCKY NUMBERS?

**NUMBERS COUNT**

Mike Mudge sets another poser for all you maths freaks.

The positive integers consist of 1,2,3,4,5,... The removal of the even integers from this sequence produces the sequence of odd integers: 1,3,5,7,9,... The removal of every third integer then yields: 1,3,7,9,13,15,19,21,... The removal of every seventh integer then yields: 1,3,7,9,13,15,19,21,25,31,33,37,43,49,... (ie, this process will remove 1,118 terms from the first 10,000 integers).

In 1956 Stanislaw M Ulam, then director of the Mathematics Division of the Los Alamos Scientific Laboratory, formulated this 'sieving' algorithm and coined the name Lucky Numbers for those integers 'fortunate enough' to survive it — eg, the fifth lucky number is 13, the tenth 33, the hundredth 613, and the one-thousandth 809.

Many questions arise concerning lucky numbers, parallel to the classical ones asked about prime numbers; the latter being those positive integers exactly divisible by themselves and unity viz

2,3,5,7,11,13,17,19,23,29,... eg, the fifth prime is 11, the tenth 29, the hundredth 541, and the one-thousandth 7919. There are 1,229 primes less than 10,000.

### Problem

Can every positive integer be expressed as the sum of two lucky numbers?

### Historical note

In a letter to Leonhard Euler written on 7 June 1742, Charles Goldbach conjectured that every positive integer greater than four could be expressed as the sum of two odd prime numbers. This conjecture has yet to be proved (or disproved).

Submit a program which generates all of the lucky numbers less than or equal to a given integer and counts them — together with the number of twin luckies (that is, pairs of lucky numbers differing by two, eg, 67-69, 2113-2115); these counts to be available for comparison

with the known results for primes and twin primes.

Use the output of the program to attempt to represent every positive integer greater than 4 as a sum of two lucky numbers. This representation need not be unique, but the upper bound to which it is completely achieved is an essential part of the output.

All submissions should include program listings, hardware descriptions, run times and output; they will be judged for accuracy, originality and efficiency (not necessarily in that order) and it is hoped to award a suitable prize to the 'best' entry.

Entries, to arrive by 1 April, to: Mr M. R. Mudge BSc FIMA FBSC, Room 560/A, Department of Mathematics, The University of Aston in Birmingham, Gosta Green, Birmingham B4 7ET.

Note: Submissions will only be returned if suitable stamped addressed envelopes are included.