THE DUODECIMAL BULLETIN

The Duodecimal Bulletin

Vol. 45;(53.), No. 2, Year 11#0;(2004.)

Whole Number: 8#; 8 Dozen Eleven
Volume: 45; 4 Dozen 5
Number: 2; 2
Year: 11#0; 1 Great Gross 1 Gross Eleven Dozen

ISSN 0046-0826

DOZENAL SOCIETY OF AMERICA

THE DOZENAL SOCIETY OF AMERICA
c/o Mathematics Department
Nassau Community College
Garden City, New York 11530-6793

FOUNDED 1160;(1944.)

= Annual Meeting: October 2nd @ Bank Street College, NYC- See page 1⚹=

THE DOZENAL SOCIETY OF AMERICA

(Formerly: The Duodecimal Society of America)

is a voluntary, non profit, educational corporation, organized for the conduct of research and education of the public in the use of base twelve in numeration, mathematics, weights & measures, & other branches of pure & applied science.

Membership dues are $12 (US) for one calendar year. Student Membership is $3 (US) per year, and a life Membership is $144 (US).

The Duodecimal Bulletin is an official publication of the DOZENAL SOCIETY OF AMERICA, INC., % Math Department, Nassau Community College, Garden City, LI, NY 11530-6793.

△ △ △ △

THE DUODECIMAL BULLETIN

Whole Number Eight Dozen El

Volume Four Dozen Five

Number 2;

11#0;

FOUNDED 1160;(1944.)

IN THIS ISSUE

□ □ □

The DSA does NOT endorse any particular symbols for the digits ten and eleven. For uniformity in publications we use Cap X with strikeout (⚹) for ten and the octothorpe (#) for eleven. Whatever symbols are used, the numbers commonly called "ten", "eleven" and "twelve" are"dek", "el" and "do" (pronounced *dough*) in the duodecimal system. When it is not clear from the context whether a numeral is a decimal or a dozenal, we use a period as a unit point for base ten and a semi-colon, or Humphrey point, as a unit point for base twelve. Thus ½ = 0.5 = 0;6

President's Message

During the years 11#0;(2004.) and 11#1;(2005.), The Dozenal Society of America proudly commemorates two anniversaries. Five dozen years ago - in 1160; - we were chartered as a non-profit, educational society dedicated to the advancement of the pursuit of duodecimals in mathematics and pure and applied science. The following year saw the publication of the first issue of this *Bulletin* which serves as our lifeline.

During the two years of this double celebration we have a number of dynamic activities planned. For example, in each of the four *Bulletins* a reprint of a classic article from our past. Thus we will honor some of the pioneers that enabled us to initiate our educational venture those five dozen years ago. (See page 5 in this issue for J. Halcro Johnson's excellent "The Reverse Notation".) Also, a number of puzzles, problems and solutions will be included in the forthcoming issues of the *Bulletin*.

We continue our five dozenth anniversary celebration with a presentation at our Annual Meeting entitled "The Most Appealing Integer Twelve: Five Dozen Intriguing Ideas Where Duodecimals Play a Role" by your President. In this talk, the role of dozens in pure and applied mathematics, computer science, and technology will be addressed. Other activities for this meeting include a discussion of dozens in the education of youngsters and how they can serve as an enhancement to learning. The members of The Bank Street Community (faculty and staff) have been invited to join with us in a unique educational experience.

This meeting will take place on Saturday 2 October 11#0; (October 2, 2004) at 10:00 A.M. at The Bank Street College of Education located in New York City - the city which serves as the birthplace of our Society. See page 1⚹ for details.

We invite our readers and membership to contribute to the Bulletin, correspond with us, invite friends to join our Society and most importantly to attend and participate at our Annual Meeting. In this light I draw your attention to the excellent ideas presented by our readers in the "Mail Bag" found on page 1#. My best wishes to all as we continue our dozenal journey.

Professor Jay L. Schiffman, President
The Dozenal Society of America

□ □ □

Do you have an idea to share with our members?
Why not submit an article to our Bulletin?

THE REVERSE NOTATION

by J. Halcro Johnston

[*Continuing the celebration of our two anniversaries as mentioned in the previous issue, we present another classic article from the past. This is reprinted from Vol. 6, No. 2, August 1166;(1950.) pp 25;-30;*]

That the Arabic Notation is not perfect is well known to readers of *The Duodecimal Bulletin*: the absence of the common factors 3, 4, and 6 from the base on which it is founded is the most obvious of its shortcomings. Had twelve been adopted in place of ten for that base, the necessity for either *The Bulletin* or the Society that it represents could hardly have arisen.

That the notation fails in another respect is, however, not so well known and it is to this other shortcoming that I wish to draw attention. The Arabic Notation is a one-way system and can best be pictured as a one-way street. This is due to the fact that all the digits used, 1 to 9, operate in the same direction: if 4, for instance, represents 4 paces to the east, 3 will represent 3 paces in the same direction and there is no digit to represent 3 paces to the west. We are, of course, quite free to label the street for traffic in either direction, east-going or west-going, but having once decided on the direction it is a troublesome operation to change it, equivalent to having another street for traffic in the opposite direction; in the language of arithmetic we introduce negative numbers and negative numbers are well known to be troublesome.

The reader may remark here that negative numbers are not often required in every-day life. This, however, is not quite correct: negative numbers are used to a large extent but are not usually labeled as such. Subtraction indicates that they are present and subtraction is a common operation. In book-keeping two sides of the folio or two columns are used, one for the debits and the other for the credits; if the latter are represented by positive numbers, the former should be represented by negative ones, and vice versa. To find the balance of an account the positive and negative entries have to be kept separate, totaled separately, and the totals then subtracted - a lengthy and cumbersome operation due entirely to the defective notation used. The surveyor engaged in leveling to find the heights above sea level of different points on the Earth's surface meets with the same difficulty: separate columns in his level-book have to be kept for positive and negative readings and differences.

There is another disadvantage in the use of digits all of the same sign: half the number used, 6 to 9 in the decimal notation and 6 to # in the duodecimal, are unnecessarily large and cumbersome and the resulting notation is heavy and unbalanced and does not lend itself to approximate methods of arithmetic. This is illustrated in the use of 3:55 for 5 minutes to 4 o'clock and 999 for 1 less than 1000. [Reverse Notation, as you will soon see, would write them respectively as 4:0$\bar{5}$ and 100$\bar{1}$ giving a more accurate visual impression of their approximate value. -Ed.]

The mistakes of the Arabic Notation are all eliminated in the Reverse Notation which is based on twelve and has equal numbers of positive and negative digits. No digit larger than 6 is used, and subtraction is no longer a separate operation: it is replaced by addition. Only one column or one side of the folio is needed in book-keeping, the sum of a number of debits and credits is their algebraic sum and gives the balance directly. As there is no digit greater than 6, approximate results can be obtained simply by replacing the unwanted digits on the right of the number by 0's. Numbers of both signs are treated on exactly the same footing and, once the pupil has learned the rules of addition and the new multiplication table, the old difficulties associated with negative numbers may be forgotten.

No More Subtraction!

The digits used are:

$\bar{6}$ called	rix
$\bar{5}$	riv
$\bar{4}$	ror
$\bar{3}$	re
$\bar{2}$	ru
$\bar{1}$	ron
0 to 6	as present

Arranged symmetrically about 0 the first five dozen numbers with their names are given in Table 1.

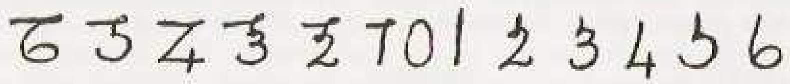
TABLE 1

$\overline{25}$ ru-riv	$\overline{15}$ ron-riv	$\bar{5}$ riv	1$\bar{5}$ 1-riv [7]	2$\bar{5}$ two-riv
$\overline{24}$ ru-ror	$\overline{14}$ ron-ror	$\bar{4}$ ror	1$\bar{4}$ 1-ror [8]	2$\bar{4}$ two-ror
$\overline{23}$ ru-re	$\overline{13}$ ron-re	$\bar{3}$ re	1$\bar{3}$ 1-re [9]	2$\bar{3}$ two-re
$\overline{22}$ ru-ru	$\overline{12}$ ron-ru	$\bar{2}$ ru	1$\bar{2}$ 1-ru [dek]	2$\bar{2}$ two-ru
$\overline{21}$ ru-ron	$\overline{11}$ ron-ron	$\bar{1}$ ron	1$\bar{1}$ 1-ron [el]	2$\bar{1}$ two-ron
$\bar{2}$0 ru-do[1]	$\bar{1}$0 ron-do	0	10 do	20 two-do
$\bar{2}$1 ru-1	$\bar{1}$1 ron-1	1	11 one-one	21 two-1
$\bar{2}$2 ru-2	$\bar{1}$2 ron-2	2	12 one-two	22 two-2
$\bar{2}$3 ru-3	$\bar{1}$3 ron-3	3	13 one-three	23 two-3
$\bar{2}$4 ru-4	$\bar{1}$4 ron-4	4	14 one-four	24 two-4
$\bar{2}$5 ru-5	$\bar{1}$5 ron-5	5	15 one-five	25 two-5
$\bar{2}$6 ru-6	$\bar{1}$6 ron-6	6	16 one-six	26 two-6

The numbers from 1 to 100 are given in Table 2 (See page 11;). Note that 6 can be replaced by ¯6 and vice versa provided 1 or $\bar{1}$ is added to the digit on the left; 6 and 1$\bar{6}$ represent the same number, the former being used if followed by any of the digits $\bar{1}$ to $\bar{6}$ and the latter if followed by any of the digits 1 to 6.

The symbols adopted to represent the new digits will be recognized as those already in use for the characteristics of the logarithms of fractions. Each consists of two parts, a digit and a bar. A single new symbol would have been preferable but it will be appreciated that consideration of typing and printing limit our choice in the matter. For manuscript use I suggest the following:

[1] Or Ru-dozen, etc.



ADDITION Just as we had to learn at school that 2 and 2 make 4, so also is it necessary to memorize the sums of every pair of digits, thus:

$$\begin{array}{rrrrr} \bar{5} & \bar{2} & \bar{4} & 3 & \bar{5} \\ \underline{+4} & \underline{+6} & \underline{+4} & \underline{+6} & \underline{+\bar{3}} \\ \bar{1} & 4 & 0 & 1\bar{3} & \bar{1}4 \end{array}$$

Having learned to sum the digits in pairs sums of any size should present no difficulty:

EXAMPLE

$$\begin{array}{rr} 43 & 02\bar{1} \\ 4 & \bar{4}0\bar{4} \\ \overline{154} & 403 \\ \bar{1} & \overline{43}3 \\ & \bar{3}4\bar{2} \\ 1\bar{3} & 532 \\ \overline{12} & 060 \\ 1 & \overline{15}3 \\ 1 & \bar{1}15 \\ 10 & \overline{51}5 \\ & \overline{545} \\ \hline 10\bar{2} & \bar{2}4\bar{3} \end{array}$$

The total of the units is $1\bar{3}$ and 1 is carried forward to the dozens. The total of the third column from the left is $\overline{12}$ and $\bar{1}$ is carried forward. The totals of all the other columns are merely the digits shown below them. Note that the carry-forward is usually either 0 or a small number and that groups of digits often cancel out. [For example, we experience this when summing deviations such as 3, 6, -10, 0, -3, -4, 5, 9, -7, 8, -5, -2, -1 wherein the 3 & -3 cancel each other out as do the pair 5 & -5 leaving 6, -10, -4, 9,-7, 8, -2, -1. Now eliminating the triads 6, -4 & -2 and -7, 8 & -1, we are left adding only -10 & 9 which yields -3. -Ed] If the sum to the nearest 1,000 had been all that was required it could have been obtained though the two columns on the right were omitted.

SUBTRACTION Subtraction is replaced by addition: the number to be subtracted is replaced by one of the same magnitude but opposite sign which can then be added in the usual way. To find the opposite number the digits are reversed, thus: to subtract $14\bar{3};6$ add $\overline{14}3;\bar{6}$, to subtract $\bar{2}2\bar{5}$ add $2\bar{2}5$.

MULTIPLICATION Unfortunately multiplication calls for the memorizing of a new multiplication table - Table 3 (See page 12;). But it is not a difficult table to memorize: a cursory examination will reveal a remarkable degree of symmetry and order plus it contains many more zeros. Having learned the multiplication table we proceed as in ordinary arithmetic.

EXAMPLE Multiply $1,\bar{5}32$ by $2,11\bar{3}$

$$\begin{array}{r} 1\bar{5}32 \\ \underline{21\bar{1}3} \\ 22\bar{3}6 \\ \bar{1}5\bar{3}2 \\ 1\bar{5}32 \\ \underline{1264} \\ 1312\overline{35}6 \end{array}$$

If the result to three significant figures was all that was required we should proceed as follows:

$$\begin{array}{r} 1\bar{5}32 \\ \underline{21\bar{1}3} \\ 1264 \\ 1\bar{5}3 \\ \bar{1}5 \\ \underline{3} \\ 1313 \end{array}$$

which gives the approximate product 1,310,000.

DIVISION As in ordinary arithmetic division is a matter of trial and error. We try different divisors and select that one that gives the least remainder. But whereas in ordinary arithmetic the remainder must be the least positive one and may be any number less than the divisor, in the Reverse Notation it may be positive or negative but must be less than *half* the divisor.

<u>Example(i)</u> Divide 2$\bar{2}$,$\bar{3}\bar{3}$1 by 3

$$
\begin{array}{l}
3)\,2\overline{233}1\,(1\bar{5}3\bar{1}0 \\
\quad \bar{3} \\
\quad 12 \\
\quad 13 \\
\quad\; 1\bar{3} \\
\quad\; \bar{1}3 \\
\quad\;\; 0\bar{3} \\
\quad\;\;\; 3 \\
\quad\;\;\; 1
\end{array}
$$

This will be worked out in long division to show all the steps:

<u>Example(ii)</u> Divide 1$\bar{3}$14$\bar{1}$ by 512;$\bar{2}$ and obtain the result correct to one duodecimal place:

$$
\begin{array}{l}
512;\bar{2}\;)\,1\bar{3}14\bar{1}\,(\;2\bar{3};56 \\
\qquad\qquad \bar{1}2\bar{2}\bar{4}4 \\
\qquad\qquad\; \bar{1}\bar{1}03 \\
\qquad\qquad\; 1336 \\
\qquad\qquad\;\; 24\bar{3} \\
\qquad\qquad\;\; \overline{215} \\
\qquad\qquad\;\;\; 24 \\
\qquad\qquad\;\;\; \overline{26} \\
\qquad\qquad\;\;\;\; \bar{2}
\end{array}
$$

The required answer is 2$\bar{3}$;5

<u>FRACTIONS</u> If p is a prime number > 3, p = 2n+1, by Fermat's Theorem it will be a factor of either 10^n+1 or 10^n-1 and when 1/p is expressed as a recurring duodecimal it will belong to one or other of two corresponding types. If p is a factor of 10^n+1 it can be shown that its period will alternate in sign, thus:

1/7 = 0;2$\overline{35}$,$\bar{2}$35,2$\overline{35}$, ...

Factors of 10^n-1, on the other hand, may or may not alternate in sign, thus:

1/1$\bar{1}$ = 0;111 ...

which does not alternate in sign (where n is prime I have not so far found any factor of 10^n-1 that alternates).

Expressed as duodecimals the simple fractions are as follows. Alternating duodecimals are marked thusly: (a). [The dots above the digits indicate the repeated period, for example 1/5 = 0;$\dot{2}\dot{5}$ (a)= 0;25$\overline{25}$25$\overline{25}$... - Ed.]

1/2 = 0;6 1/5 = 0;$\dot{2}\dot{5}$ (a) 1/1$\bar{4}$ = 0;16 1/# = 0;$\dot{1}$... 3/4 = 1;$\bar{3}$ 5/1$\bar{4}$ = 1;$\bar{5}$6 = 1;$\overline{46}$	1/3 = 0;4 1/6 = 0;2 1/1$\bar{3}$ = 0;14 1/10 = 0;1 5/6 = 1;$\bar{2}$	1/4 = 0;3 1/1$\bar{5}$ = 0;$\dot{2}\overline{3\dot{5}}$... (a) 1/12 = 0;1$\dot{\bar{2}}3\dot{5}$... (a) 2/3 = 1;$\bar{4}$ 3/1$\bar{4}$ = 0;5$\bar{6}$ = 0;46

<u>LOGARITHMS</u> Some of the advantages of the Reverse Notation are found in the use of reverse logs. The troublesome negative characteristic of the ordinary notation which always looks so lonely in a one-way system falls naturally into place in the homey surroundings of the two-way system, while complicated calculations involving multiplication and division are replaced by the single operation, addition.

<u>EXAMPLE</u>

Find *d* where $d^2 = \dfrac{4 \times 600}{\pi \times 3;\bar{4} \times 6;3\bar{3}5}$

$$
\begin{array}{rrcl}
\log & 600 & = & 3;\overline{342}0 \\
\log & 4 & = & 1;\overline{54}41 \\
-\log & \pi & = & 0;\overline{564}0 \\
-\log & 3;\bar{4} & = & 0;\bar{5}32\bar{1} \\
-\log & 6;3\bar{3}5 & = & \bar{1};320\bar{5} \\
\hline
 & & 2) & 2;\bar{4}30\bar{5} \\
 & & & 1;\bar{2}16\bar{2}
\end{array}
$$

From the tables we find that this is the log of 1$\bar{4}$;14 which is the value of *d* required.

The logs used in the above example are from a brief table given in my book *The Reverse Notation*[2] which was compiled with the help of the table from Mr. Andrews' *New Numbers*[3].

Like a new language the Reverse Notation may appear strange and forbidding on first acquaintance and, as in the learning of a new language, this aspect will only disappear after a period of constant use. Before even simple calculations can be made one must be able to add and multiply any pair of digits without stopping to think $3+\bar{5} = \bar{2}$ or $4 \mathrm{x} \bar{6} = \bar{2}0$. Let us assume that we have acquired equal facility in the use of both notations, the old and the new, and let us see how they will compare. Addition should be quicker and easier in the two-way system due to the cancelling of groups of two or more digits which total 0, and the smaller numbers, if any, to carry forward. In bookkeeping and logarithms time would be saved due to the elimination of subtraction as a separate operation. Multiplication and division would benefit from the simpler multiplication table and the greater number of factors in base twelve than in base ten. On the other hand, apart from the loss of 5 as a base factor, I have not discovered any way in which we would lose by giving up the present system in favour of the Reverse Notation.

Calculator a Boon to Proofreading!

In our last issue we published a report of a dozenal calculator produced by Michael Punter of England. Michael recently joined our Society as member number 37X. This calculator proved very handy in proofreading this article saving us many hours of work.

Thanks Michael.

If you have not already done so, contact Michael to obtain a copy at:
michael.punter@talk21.com

---

[2] *The Reverse Notation*, J. Halcro Johnston, Blackie & Son Ltd., London & Glascow, 1937

[3] *New Numbers*, F. Emerson Andrews, Harcourt Brace Co., NY, 1935, Faber & Faber Ltd., London 1936, and Essential Books, NY, 1944,

TABLE 2

1	2	3	4	5	6	$1\bar{5}$	$1\bar{4}$	$1\bar{3}$	$1\bar{2}$	$1\bar{1}$	10
11	12	13	14	15	16	$2\bar{5}$	$2\bar{4}$	$2\bar{3}$	$2\bar{2}$	$2\bar{1}$	20
21	22	23	24	25	26	$3\bar{5}$	$3\bar{4}$	$3\bar{3}$	$3\bar{2}$	$3\bar{1}$	30
31	32	33	34	35	36	$4\bar{5}$	$4\bar{4}$	$4\bar{3}$	$4\bar{2}$	$4\bar{1}$	40
41	42	43	44	45	46	$5\bar{5}$	$5\bar{4}$	$5\bar{3}$	$5\bar{2}$	$5\bar{1}$	50
51	52	53	54	55	56	$6\bar{5}$	$6\bar{4}$	$6\bar{3}$	$6\bar{2}$	$6\bar{1}$	60
$1\bar{6}1$	$1\bar{6}2$	$1\bar{6}3$	$1\bar{6}4$	$1\bar{6}5$	$1\bar{6}6$	$1\overline{55}$	$1\overline{54}$	$1\overline{53}$	$1\overline{52}$	$1\overline{51}$	$1\bar{5}0$
$1\bar{5}1$	$1\bar{5}2$	$1\bar{5}3$	$1\bar{5}4$	$1\bar{5}5$	$1\bar{5}6$	$1\overline{45}$	$1\overline{44}$	$1\overline{43}$	$1\overline{42}$	$1\overline{41}$	$1\bar{4}0$
$1\bar{4}1$	$1\bar{4}2$	$1\bar{4}3$	$1\bar{4}4$	$1\bar{4}5$	$1\bar{4}6$	$1\overline{35}$	$1\overline{34}$	$1\overline{33}$	$1\overline{32}$	$1\overline{31}$	$1\bar{3}0$
$1\bar{3}1$	$1\bar{3}2$	$1\bar{3}3$	$1\bar{3}4$	$1\bar{3}5$	$1\bar{3}6$	$1\overline{25}$	$1\overline{24}$	$1\overline{23}$	$1\overline{22}$	$1\overline{21}$	$1\bar{2}0$
$1\bar{2}1$	$1\bar{2}2$	$1\bar{2}3$	$1\bar{2}4$	$1\bar{2}5$	$1\bar{2}6$	$1\overline{15}$	$1\overline{14}$	$1\overline{13}$	$1\overline{12}$	$1\overline{11}$	$1\bar{1}0$
$1\bar{1}1$	$1\bar{1}2$	$1\bar{1}3$	$1\bar{1}4$	$1\bar{1}5$	$1\bar{1}6$	$10\bar{5}$	$10\bar{4}$	$10\bar{3}$	$10\bar{2}$	$10\bar{1}$	100

[Continued on next page]

o o

Problem Corner

Problem 1. Twin primes are odd primes p and p+2 which differ by 2. Eg, 3 and 5. Show that for p > 4 the sum of p and p+2 is a multiple of twelve.

Problem 2. How many zeros are at the end of X0!?

[Solutions page 1X]

TABLE 3

	$\bar{6}$	$\bar{5}$	$\bar{4}$	$\bar{3}$	$\bar{2}$	2	3	4	5	6
$\bar{6}$	30	26	29	16	10	$\bar{1}0$	$\overline{16}$	$\bar{2}0$	$\overline{26}$	$\bar{3}0$
$\bar{5}$	26	21	$2\bar{4}$	13	$1\bar{2}$	$\bar{1}2$	$\overline{13}$	$\bar{2}4$	$\overline{21}$	$\overline{26}$
$\bar{4}$	20	$2\bar{4}$	14	10	$1\bar{4}$	$\bar{1}4$	$\bar{1}0$	$\overline{14}$	$\bar{2}4$	$\bar{2}0$
$\bar{3}$	16	13	10	$1\bar{3}$	6	$\bar{6}$	$\overline{13}$	$\bar{1}0$	$\overline{13}$	$\overline{16}$
$\bar{2}$	10	$1\bar{2}$	$1\bar{4}$	6	4	$\bar{4}$	$\bar{6}$	$\bar{1}4$	$\bar{1}2$	$\bar{1}0$
2	$\bar{1}0$	$\bar{1}2$	$\bar{1}4$	$\bar{6}$	$\bar{4}$	4	6	$1\bar{4}$	$1\bar{2}$	10
3	$\overline{16}$	$\overline{13}$	$\bar{1}0$	$\bar{1}3$	$\bar{1}6$	6	$1\bar{3}$	10	13	16
4	$\bar{2}0$	$\bar{2}4$	$\overline{14}$	$\bar{1}0$	$\bar{1}4$	$1\bar{4}$	10	14	$2\bar{4}$	20
5	$\overline{26}$	$\overline{21}$	$\bar{2}4$	$\overline{13}$	$\bar{1}2$	$1\bar{2}$	13	$2\bar{4}$	21	26
6	$\bar{3}0$	$\overline{26}$	$\bar{2}0$	$\overline{16}$	$\bar{1}0$	10	16	20	26	30

△ △ △ △

π MNEMONIC

The following nemonic for the decimal approximation of π to 18;(20.) places by **Dylan Martinez** of Pueblo CO appeared in "Ask Marilyn", *Parade*, 30 May 2004. The number or letters in each word gives the correct digit, showing that decimally π ≈3.14159 26535 89793 23846.

Sir, I send a rhyme excelling/ In sacred truth and rigid spelling
Numerical sprites elucidate/ For me the lexicon's full weight

Can you produce a mnemonic for dozenal π ≈ 3;184809 493#91 866457 3X6211 ##1515 51X057 29290X 7809X4 927421 40X60X 55256X 0661X0 3753X3 XX5480?

We will print the best one(s) we receive. Note the punctuation between the first 2 words. (A semicolon would be ideal.)

ANNUAL AWARD

The Society is pleased to announce that its Annual Award named in honor of one of our founders has been awarded to Director Rob Roy. For an accounting of Rob's activities on behalf of the DSA see our previous issue.

The Society has presented Rob with a plaque which reads as follows:

THE RALPH BEARD MEMORIAL AWARD

of the

DOZENAL SOCIETY OF AMERICA

is hereby presented to

ROB ROY McPHERSON, 4#

For his dozens of years of service to our Society as
a Member of our Board of Directors &
for his outstanding dedication & devotion as
an advocate of Dozenal Counting & Measuring -
especially his efforts inducing people to actually use base twelve numerals.

In addition, his countless hours of service as founder and director of
the BASE TWELVE NUMERALS LABORATORY
is gratefully acknowledged.

Given with appreciation by the Board of Directors

11#0; 2004.

NEWS FROM OUR BRITISH FRIENDS

Press release from The British Weights and Measures Association (BWMA)

A warning from England
Don't Do It!

US Department of Commerce agency to abolish use of pounds, ounces and pint measures for packaged foods and goods

Metric conversion to be compulsory for retail transactions in USA. (See below.)

Further details are available from:
http://www.bwmaonline.com/Metric%20proposal.htm

Including:

The Legal Dispute - is NIST contravening US law?
American consumers beware - The Great Metric Rip-Off
The story of the English metric martyr traders
The full wording of the NIST proposal

And External links and related materials:

NIST Metric Group
The NIST Proposal (Microsoft Word)
Metric Conversion Act 1975
Fair Packaging and Labeling Act 1966

BWMA PRESS STATEMENT: *Bad News*

Under US government policy, transition to the metric system is voluntary in the USA. The law requires labeling for most packaged goods to show both US and metric systems so that consumers and retailers can choose.

However, the National Institute of Standards and Technology (NIST), an agency within the US Department of Commerce, is to propose a bill to Congress that will end the use of inch-pound units. Hints of NIST's intention appeared in November 2002 when it held a forum to:

> "...identify areas of work needed to ensure the effective voluntary transition to the use of metric units in all commercial transactions".

To **"ensure"** something that is **"voluntary"** is a contradiction in terms. The NIST proposal is now available on the internet. How does NIST get round US government policy that metric is voluntary? It has developed a form of words

that describes its proposal as "permissible metric-only labeling", and which appears to offer a choice for business:

A. Metric and US customary; or
B. Metric

IT'S A TRICK!

The two labeling obligations proposed by NIST cannot lawfully co-exist. It is impossible for the law to require both systems to be displayed while also stating that only metric need be shown.

Accordingly, the only requirement under the NIST proposal is that packaged goods show metric. Producers may print lb/oz/pint equivalents, but such information is surplus to the legal requirement. Decoded, the phrase "permissible metric-only labeling" means **compulsory** metric labeling, since the word "permissible" actually refers to inch-pound.

The NIST proposal, if implemented, will mean the end of US measures as trading units for most packaged goods. It will be legal to describe a carton as "473mL" - but ILLEGAL as "one pint". The upheaval and costs to business will be huge, since systems and processes will have to change to accommodate metric.

Save our pounds & ounces
- It's now or never!

BRITAIN'S DISASTEROUS EXPERIENCE OF METRIC

Britain knows all about compulsory metric conversion. Since 2000, metric measures, invented in France in 1790, have been made compulsory by the European Commission. In 2001, trader Steven Thoburn was dubbed the "Metric Martyr" after being convicted and fined for selling bananas in pounds and ounces. Packaged goods are meanwhile "downsized" on conversion from English to metric quantities - with no decrease in price. Surveys show 85% of British people prefer feet and inches, pounds and ounces.

The archetype kilogram is stored in a vault near Paris - and the US requires permission from the French government to examine it. Thomas Jefferson said: "If other nations adopt this unit, they must take the word of the French mathematicians for its length...So there is an end to it!"

If Americans want to defend fair play in the marketplace and freedom to use customary measures then they must **wake up** to moves now developing to **force** them to use metric.

+++

RIP

As our last issue went to press we received word that Metric Martyr Steve Thoburn passed away. Since then we have received the following items:

Metric Martyr Steven Thoburn and four other traders have been denied their right to appeal to the European Court of Human Rights. This Appeal, had it been allowed, would have challenged abuses of due process by UK judges that led to criminalisation of traders using pounds and ounces. But it's not over yet!

They are to bring a fresh test case, but need financial support. Please make donations payable to the "Steven Thoburn (Metric Martyr) Defence Fund" and send, by post, to Metric Martyrs, PO Box 526, Sunderland SR1 3YS, England.

The British Weights and Measures Association (BWMA) issued the following statement:

Steven Thoburn

With very great regret, we report that Sunderland greengrocer Steven Thoburn, known to millions as the "metric martyr", died Sunday, March 14th 2004, following heart failure. Steven Thoburn became a household name for being the first trader in Britain to be found guilty of an offence for selling goods in pounds and ounces. Mr Thoburn received thousands of letters of support and donations totalling £300,000.

Figures in the campaign against compulsory metric conversion are shocked and saddened by the news.

Mr Thoburn said in 2001, "All I wanted to do was give my customers **what they wanted.** I'm not a hero, I'm just a hardworking man I don't want to know anything about Europe, as long as I am allowed to go to work. If [customers] wanted me to sell fruit in kilos, I'd sell fruit in kilos. In my world, what the customer wants, the customer gets".

Neil Herron, Steve's close friend and colleague, has issued the following statement,

"It is impossible at this moment to even find the words, any words which would come close to conveying the emotions we are all feeling. At 6am today, Steve

Thoburn, the Sunderland Greengrocer, died of a massive heart attack at his home in Sunderland.

At this moment, it is difficult for us all to comprehend this enormous loss and everyone is numb and shell-shocked with total disbelief. It was an honour to have known and to stand shoulder to shoulder with such a hard-working and courageous, principled man.

The past four years created a very special bond between us that goes beyond words and Steven symbolised the true British spirit of grit and determination and fought passionately for what he truly believed in, and was acutely aware of the responsibility that had, by fate, been bestowed upon him. Anyone who knew him knew that he was a true fighter, and a man with compassion and unswerving generosity and a spirit rarely seen these days.

The world was a richer place for Steven Thoburn and we can learn a great deal from the way he led his life and the example he set. A light went out today but the flame that is Steve Thoburn will continue to burn in all of us who care as deeply and passionately as he did. He will be sadly, sadly missed but will never ever be forgotten".

From BWMA, 3/20/04: *More Bad News*

Dear Supporters,

It has come to our attention in the past few days that trading standards officers have launched raids against market traders in the London borough of Lewisham.

In the first raid, March 2nd, lb/oz weighing machines were removed. In the second, March 11th, lb/oz pricing tickets were taken away.

Five traders were targeted, whereas nearby supermarket Tesco was left untouched, even though it advertises in lb/oz. BWMA is in touch with the affected traders, and will be offering them support and assistance.

To: BWMA members and supporters: *Some Good News*

Reproduced below is a recent press release by the Conservative Party, committing themselves to repealing the metric regulations. Very good news:

Press Release, 10 May 2004

Labour calls for local crackdowns on 'metric martyrs'. Council tax bills may fund new prosecutions of shopkeepers breaching flawed Euro-directives

Bernard Jenkin MP for North Essex and Shadow Secretary of State for the Regions, warned today of a new directive being sent to every local authority in Britain, calling for council officers to initiate new prosecutions of shopkeepers who sell their loose goods, like bananas, in pounds and ounces.

A leaked memo from the Labour-chaired Local Government Association calls on councils to "re-commence their enforcement of metrication regulations" and to "deal with offences in an appropriate manner with full confidence in the forces of UK law". This opens the door for councils across the country to spend local taxpayers' money on investigating and prosecuting vendors who sell in imperial measures.

Conservative Stance

Mr Jenkin condemned the plans: "People wonder why council tax bills are going through the roof without matching improvements in frontline services. One of the reasons is the constant stream of pointless directives and red-tape flowing from Brussels and Whitehall.

"Our local councils are now being instructed by Labour-run bureaucrats to spend money on prosecuting market traders and greengrocers for the 'crime' of serving goods like bananas in pounds and ounces.

"Local authorities should concentrate on providing services to the public not persecuting honest shopkeepers. Whether traders in this country choose to sell in imperial or metric units should be a matter between them and their customers.

"Conservatives would reinstate the rights to sell such goods in pounds and ounces. We secured this change to this EU Directive before and would do so again. Conservatives are on the side of consumer choice, small businesses and the pound - in all its forms."

Notes to Editors

About the Metrication Directive Since January 2000, traders have been forced to sell fruit, vegetables and other 'loose from bulk' produce in kilograms and grams rather than in pounds and ounces. This is a result of the expiry of the opt-out (the 'derogation') permitting the sale of loose goods to be sold in imperial

measures.

The EU Directive dates from 1979. The opt-out was negotiated by the last Conservative Government in 1989 and lasted for ten years until 31 December 1999. The EU Commission agreed to a further 10 year derogation to permit dual measures to be displayed, provided the metric measure predominates, because all EU member states sought such a derogation to avoid having to produce separate labels for their exports to the USA which continues to require imperial measures. Yet in 1999, the Labour Government did not seek a continuing derogation for the domestic sale of loose goods in imperial units even though such goods are not internationally traded.

Sellers of loose goods, market traders, delicatessens, et al must therefore weigh and sell only in metric units, although they may display prices in imperial units too, provided the metric predominates. Polls show a continuing preference by shoppers for imperial units.

The first 'metric martyr' was the late Steven Thorburn, a fruit-and-veg trader. He was the first to be prosecuted after trading standards officers seized his scales in July 2000. He was fined and given a six-month conditional discharge in April 2001 by Sunderland City Council for selling a pound of bananas from his stall in Southwick market.

Bananas Example A bunch of five bananas weighs 0.77 kilograms, just over 1½ pounds (1 lb, 11 oz).

DO YOU HAVE A BETTER IDEA?

A member asked if there were words corresponding to: decade, century and millennium for periods of 10;(12.), 100;(144.) and 1000;(1728) years.

Recalling that our ancestors used "long hundred"[1] for groups of 120 items or persons I suggested the long decade, long century and long millennium.

Let us know if you have a better suggestion.

1. And caused much confusion to modern historians since they frequently shortened this to simply a "hundred" as in *fifty plus seventy is a hundred.*

Please join us at our

5 Dozenth Annual Meeting

which will take place from 10 AM to 3 PM on 2 October, 2004. We will once again gather at Bank Street College thanks to the efforts of our Secretary, **Christina D'Aiello**. The College is located between Broadway and Riverside at 610 West 112th Street / NY, NY 10025 and we are meeting in room 710.

As is our custom we will dine together at a nearby restaurant - this year to *celebrate our anniversary!*

For directions see: http://www.bankstreet.edu/about/visiting.html or call (631) 669 0273. (For the Bank Street guard's desk/information call (212) 875 4411.)

Solutions to Problem Corner

(See page 11)

Solution 1. p+1 is even and neither p nor p+2 is divisible by 3. Hence p and p+2 are of the form 6n-1 and 6n+1. Their sum is 10;n.

Solution 2. We need to know how many factors of 3 and how many factors of 2 are contained in ✱0!.

Dividing ✱0 repeatedly by 2 and then by 3 we obtain:

2)✱0	3)✱0
2)50	3)34
2)26	3)11
2)13	3)4
2)7	1
2)3	
1	

Adding the quotients of the division by 2 yields 50 + 26 + 13 + 7 + 3 + 1 = 98 factors of 2 and hence 98/2 or 4✱ factors of 4. Hence there at most 4 dozen and ✱ trailing zeros.

Adding the quotients of the division by 3 we obtain 34 + 11 + 4 + 1 = 4✱ and thus we have exactly 4 dozen and ✱ trailing zeros.

MAIL BAG

Letter from Michael Thomas De Vlieger, AIA, New Life Member 37#:

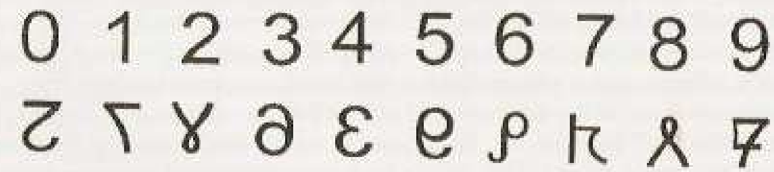
It's a delight having found the Dozenal Society. I've been using dozenal since age fifteen, having been introduced to it in seventh grade. Dozenal is a practical device; I am an architect, and use it to great advantage in my work. Originally, it was a means to encode my days, tallying them since my birth date. Fluency in dozenal came quickly, within weeks of exploring it. I've spread it among high school friends, and we were under the impression it was unique to us. I'm now thirty-three; I still use the dozenal date system as serial numbers. For example, today is 7168. I'm in business, and give all projects a dozenal number according to the date it would finish.

> Dozenal is a practical device; I am an architect, & use it to great advantage in my work.

I'm intrigued, having found the British society uses the same reversed 2 for ten. My symbols are part of a larger system developed for base 60. Initially, I used hexadecimal between ages thirteen to fifteen, so the extended digits are "Hindu-Arabicizations" of the hexadecimal letters. These digits were crafted to be harmonious with the current systems of digits, using formal precedent when possible.

The ten-digit is called desen (rhymes with lesson), uses the reversed two because it is even, and the form has precedence in the existing number set. The name comes from the Indo-European "dek," adding the –en from seven to "soften" the harsh, barbaric sound of "dek".

The eleven symbol is called dalen, (pronounced in a way some people say darling). This symbol is a reversed seven, again because of formal precedence and because, like seven, eleven is prime. I don't use the British reversed three, mainly because eleven has little to do with the letter E or 3. Eleven in other languages is undici, oddinadtsat, ihdash, and in these, the "e" makes no sense. I use their symbol to signify fourteen, harmonious with the hexadecimal common in the digital industry. My numerals from 0 thru 17; appear in the figure below.



In 1991, I produced an extensive set of tables in dozenal. Thus I am delighted to see the extensive set of tables your organization has produced. In the near future, I plan to develop an interactive website that lets the user see for themselves which base is most useful. I am a convert from decimal to hexadecimal to sexagesimal to dozenal. I have my reasons, as you are all familiar with. Hexadecimal is too square and boxy; sexagesimal is too cumbersome but delightfully poetic. It's my hope others will use their logic and intuition to find how comfortable, romantic, poetic dozenal is.

Michael Thomas De Vlieger, AIA

The number names for ⚹ thru 19; follow::
⚹ Desen (Dess'-en), Dess
Dalen (Doll'-en), Dhall (thall, with the th in "bathe")
10; Nish, Nix (both pronounced "nish")
11; Thine (Said as if someone was)
14; Hexan (Hecks'-en), Hex.
15; Locht (Lot) = eighth in series {1, 2, 3, 5, 7, 11, 13, 17}
16; Tresex (Tress'-icks) =3(6), Lynick (L lisping "sign")
12; Disef (Die'-sef), Dive = 2(7)
13; Trepent (Trep'-ent), Trepp = 3(5inn'-ick)
17; Nove (Nove) = ninth in series {1,2,3,5,7,11,13,17,19}
18; Vigint (Vidge'-int), Vidge.
19; Tresef (Tress-if) = 3(7)

+++

Letter from Bryan Parry, bajparry@yahoo.co.uk

I had never seen a *good* base 12 number system. Thus, I created this one (which hopefully is). Decimal numbers are on the left hand side of the slash, dozenal on the right. I have adopted a variant of the symbols for nine plus one and nine plus two as supported by the dozenal society of Great Britain. Where I have deviated from normal numbers where you might not expect me to (e.g. Nine = "en") I have done so for practical reasons only. I have tried to create reasonable and distinct sounding names, that are easy to say. The "teens" are accommodated by the suffix -twe, and the dozens beyond that by the suffix -do. Occasionally, you may note "blips" in the spelling such as ad + twe = addwe. This is a simple matter of assimilation, that which occurs so that adjoining consonants move to the same point of articulation etc. (for ease of speech). Thus, sometimes "-do" becomes -to. Occasionally, some vowels may also be missed (e.g. One + twe = ontwe). This, too, is for pronunciation and language reasons. Sometimes, though, I have not done this when by pattern I should have- this is so as to indicate pronunciation.

1/1 = One
2/2 = Two
3/3 = Three
4/4 = Four
5/5 = Five
6/6 = Six
7/7 = Sept (pronounced "set", like the French number for seven)
8/8 = Ad
9/9 = En
10/Í = Dene (pr. "deen")
11/Ú = Elf (German for eleven)
12/10 = Twelve
13/11 = Ontwe
14/12 = Tutwe (pr. Tut-wee or too-tway)
15/13 = Thretwe (pr. Thret-wee, thret-way)
16/14 = Fortwe
17/15 = Fiftwe (sometimes I pronounce this "fye-wee")
18/16 = Sixtwe (I have come to pronounce this as "sight-wee")
19/17 = Septwe (set-wee, set-way)
20/18 = Addwe
21/19 = Entwe
22/1Í = Dentwe (sometimes denetwe - "den-et-way")
23/2Ú = Elftwe (I usually do not pronounce the t here)
24/20 = Tudo (pr. "too-doh")
25/21 = Tudo one
26/22 = Tudo two
27/23 = Tudo three
...
36/30 = Thredo (I often pronounce this as "thray-doh")
48/40 = Fordo
60/50 = Fifto
72/60 = Sixto
84/70 = Septto/Seddo (Pr. "Sept-toh" or "set-toh" or "see-doh")
96/80 = Addo
108/90 = Endo
120/Í0 = Denedo
132/Ú0 = Elfto
144/100 = Gross
...
1728/1000 = Grand
2,985,984/1,000,000 = Milliad

The present year, 2003ad/11ÍÚad = Ontwe Denedo elf (or) One grand, One gross and denedo-elf

As far as higher powers go, it depends really on whether you are using the one thousand million = 1 billion system, or the one million million = 1 billion system. I will not impose, but will say that the higher names are:

1 grand milliad (or) 1 milliad milliad = 1 billiad
1 milliad milliad (or) 1 milliad milliad milliad = 1 trilliad
1 grand^6 (or) 1 milliad^6 = 1 hexiad
1 grand^12 (or) 1 milliad^12 = 1 uniad

I hope you got that. I shall rephrase, in case you did not:
One dozenal million = 1 milliad
One dozenal billion = 1 billiad
One dozenal trillion = 1 trilliad
One trilliad times by one trilliad = 1 hexiad
One hexiad times one hexiad = 1 uniad.

The values are different, obviously, due to the two different number systems used worldwide.

Even higher numbers are formed in the usual way. That is, the numbers + iad (illion in decimal). So, Grossiad, for instance.

Afterwords/notes:

I reject the often-heard "dek", amongst others, as I view them as aesthetically displeasing. If a number has to be changed, the goal is to make it easy to say, distinct, possibly vaguely English, and aesthetically pleasing (at least not distasteful).

The symbols for dene and elf are borrowed from Arabic, hence their strange style. These are as close as word can come to the 'actual' dozenal symbols for these. Though, these symbols are almost exactly right, just move them up onto the line, and Romanise their curves. Dene is like a cursive t, and elf is a back-to-front 'rounded' three.

I believe this to be a full and useful system of dozenal numeration. Obviously it is not "final", in as much as pronounciation changes, new ways are found to distinguish things, etc. Thus, if you have any comments or points to make on this system, or desire to use it etc, please contact me.

Yours,
Bryan Parry

+++

Letter from Jeff Wells, San Diego, California USA

a dozenal clock

Hello,

I've been interested in the base 12 system for years and just discovered your site. While I don't think it will be adopted any time soon I still enjoy thinking about it, and would like to offer my version of a dozenal clock:

This one has the zero hour (midnight) at the bottom instead of the top, the rationale being that from the northern hemisphere the progress of the hands follows the progress of the sun through the sky. Imagine facing south: the sun is below the horizon at night, then rises in the east or left-hand side, continues to its highest point at noon, and sets in the west or right-hand side.

Besides daily time, this clock would also reflect the calendar. The beginning of the year (winter solstice) would be at the midnight position, the summer solstice at noon, and so on. If there are twelve hours in a day, each hour would correspond to one month and the minutes would represent so many days. A third hand could be added to point to the current date, taking an entire year to circle the clock face once.

What do you think?

Sincerely,
Jeff Wells

+++

A letter from Eitan Adam Pechenick

My name is Eitan Pechenick, and I am an undergraduate student in mathematics and physics at the University of Vermont. Quite frankly, I find the idea of a dozenal counting system, along with the arguments and tips on your sites, fascinating. And despite the fact that it will not be generally used in my lifetime, I plan to personally utilize it as much as I can. Anyway, after deciding on the naming system and symbols for ten and eleven I wanted to use, I remembered this game my 8th grade algebra teacher introduced me to.

"2Doh!"
A Game in Base Twelve

It's called 24. You are given a card with 4 1-digit numbers. The object of the game is to add/subtract/multiply/divide/group the numbers so that you get 24, and to do it as fast as possible (ie. faster than whomever you're playing against).

An example: 3,5,1,9

Possible method: 5-1=4, 9-3=6, 4*6=24! (also: 5*3*1+9=15+9=24, etc.)

This game can be easily adapted to dozenal, since 24 is just 20d! (or twodoh, based on the naming system I've decided on for myself) The only real difference is that ten and eleven can be on the cards. And the benifit of the game is that it allows a person to learn to add, subtract, multiply and divide in a dozenal atmosphere. It's also really fun!

Anyway, while I'm here typing, and not sleeping, I might as well mention the symbols and naming schema I've decided on for myself:

Symbols: For 1-9, I like them the way they are. For ten & eleven, I like the upside-down 2 and the reflected 3 I saw on the DSGB site. However, for eleven, I plan to put a tail on the bottom to avoid confusion with epsilon.

Naming: 1-10: one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve/one dozen.

I like that partly because I'm lazy and like eazing into a new system. It's also because I figure it's not a coincidence that the names *already* go up to twelve before going into the teens.

Next, the "zeens": onezeen, twozeen, threezeen, fourzeen, fizeen, sixeen, sevenzeen, okzeen, ninezeen, tenzeen, elzeen, todoh

Basically, I just took the straightforward steps, but changed a couple things for aesthetics.

the dozens: twodoh, threedoh, fourdoh, fivedo, sixdo, sevendo, okdo, ninedo, tendo, elevendo, one gross

the higher-ups: for these I like Brian Parry's method. so: gross, grand, milliad, grand milliad, billiad, grand billiad, trilliad, etc. (despite the fact that I'm used to the American method)

Also, for the "dozenal place," I'm thinking a comma. (or for someone in a country where they use the comma for the decimal place, a period) I noticed that someone suggested using a bar (|) and always using it. Well, I wouldn't always use it, because that would cause trouble with significant figures in scientific measurements and calculations.

That pretty much covers what I want to say. So, I hope both intended recipients get this. If not, at least I'll have a copy in my sent mail folder for myself.

Sincerely,
Eitan Pechenick

P.S. I was fooling around with the *TGM* metric earlier, and I converted the speed of light (in a vacuum) from m/s to gf/tim. So, here it is! (dozenal--t for ten, e for eleven): 4te79100,0 gf/tim (I started with 9 significant digits. That's why I have the ,0) or about 4.e * 10^7 gf/tim

I really like how in *TGM* an object with mass 1 Mz weighs 1 Mz-Gf/Tim^2. The names used suggested for the units; however, are not very pleasant. And speaking of *TGM*, where can I find the full version of the article that was in the Dozenal Review?

+++

Letter from Jim Hartley, Member Number 76;

I was just kind of interested if this group still existed. I used to be a member (student member) of the Duodecimal Society of America back in the early 1950's when I was in Jr. High and High School. Last fall, while packing for a household move, I found a bunch of old publications (pretty much still packed); as things are settling down I remembered and did a quick Google and found your website. So I'm just curious, what is happening? And why the name change?
Jim Hartley

[Jim has since offered to donate some of his dozenal materials to our archives. Many thanks. -Ed.]

+++

Letter from Rakesh Khanna, India

Dear Sirs/Madams,

I am a native of California, resettled in South India for the last 5 years. Is there a dozenal society here? If not I feel there should be: mathematical literacy is very high in the region, people appreciate weird ideas like this, and it might actually get off the ground. I am a big dozenal advocate and would like to start a branch if it does not exist yet.

An Indian Chapter?

I am a freelance web editor and content developer for several mathematics educational websites and publishing firms. I also run a small math content development company here in Chennai. I'm not sure if you fellows have any funds to donate, but for a modest sum(say, $400 - by which I mean $576 in the usual system) we could set two experienced authors and designers to work for a full month to create a nice series of web pages, including some animations etc, to explain dozenal counting and arithmetic to a wide audience. Let me know if anyone is interested in donating, we could do some sample work first. -Rakesh

△ △ △ △

One Small Success

The Maine Department of Transportation announced that it has "decided to convert back from metric to U.S. Customary units (feet, inches, etc.). Our Units Conversion Plan provides that we will be starting all new projects in U.S. Customary units".

Way to go, Maine!

WHY CHANGE?

This same question was probably rife in Europe between the years 1000 and 1500, when the new Hindu-Arabic numerals were slowly making their inching progress in displacing the comfortable and familiar Roman numerals then universally used.

Yet, although it took D years, and despite much opposition--("Who needs a symbol for nothing?")--the new notation did come into popular use. Released from the drag of Roman notation, people's thinking leapt forward dramatically, and mathematicians discovered a new dimension in mathematical symbolism. Working with Hindu-Arabic numeration, they found that the new system better accommodated mathematical statements and facilitated the working out of ideas. Re-examining their fundamental concepts of numbers, they made advances in arithmetic, algebra, logarithms, analytic geometry and calculus, and thus contributed to the explosion of human thought which later became known as the Renaissance. Then, in a related development, people awoke to the fact that different number bases could be used.

A parallel to today seems tenable. The notation of the dozen base better accommodates mathematical statement and facilitates ideation. It, too, is a step forward in numerical symbolism. The factorable base is preferred for the very same advantages which led the carpenter to divide the foot into twelve inches, the baker and the grocer (one who deals in *grosses*) to sell in dozens, the chemist and the jeweler to subdivide the Troy pound into twelve ounces. And yet, this is accomplished by such simple means that students in the primary grades can tell why they are better. Literally, the decimal base is unsatis**FACTOR**y because it has **NOT ENOUGH FACTORS.**

Then should we change? Yes, but no change should be forced, and we urge no mandated change. All the world counts in tens. But people of understanding should learn to use duodecimals to facilitate their thinking, their computations and their measurings. Base twelve should be man's second mathematical language. It should be taught in all the schools. In any operation, the most advantageous base should be used, the one best suited to the task at hand. (Similar to computer scientists use of binary, hexadecimal or octal - whichever is most convenient.) If this were done, duodecimals would progressively earn their way into general popularity because they simplify the all-important problem of the correlation of weights and measures, the expansion of fractions (1/3 = 0;4) and give an advantage in calculations involving time and our twelve-month calendar. Perhaps by the year 2000, (or maybe by 1200; which is 14; years later!) duodecimals may be the more popular base. But then no change need be made, because people will already be using the more convenient base.

If "playing with numbers" has sometimes fascinated you, if the idea of experimenting with a new number base seems intriguing, if you think you might like to be one of the adventurers along new trails in a science which some have erroneously thought staid and established and without new trails, then whether you are a professor of mathematics of international reputation, or merely an interested pedestrian who can add and subtract, multiply and divide, your membership in the Society may prove mutually profitable, and is most cordially invited ✸

YOU ARE INVITED TO JOIN THE DOZENAL SOCIETY OF AMERICA

The only requirement is a constructive interest in duodecimals

Name ______________________________ / __ / __
Last First Middle Date

Mailing Address (including full 9 digit ZIP code)

____

____

____

Phone: Home __________ Business __________

Fax __________ E-mail __________

Business or Profession __________

Annual Dues .... Twelve Dollars (US)
Life .... One Gross Dollars (US)
Student (Enter data below) .... Three Dollars (US)
(A limited number of free memberships are available to students)

School __________

Address __________

Year & Math Class __________

Instructor __________ Dept. __________

College Degrees __________

Other Society Memberships __________

To facilitate communication do you grant permission for your name, address & phones to be furnished to other members of our Society?
Yes: ___ No: ___

Please include on a separate sheet your particular duodecimal interests, comments, and other suggestions.

Mail to: Dozenal Society of America
c/o Math Department
Nassau Community College
Garden City LI NY 11530-6793

DETACH--HERE--OR--PHOTOCOPY