DOZENAL SOCIETY OF AMERICA
c/o Math Department
Nassau Community College
Garden City, LI, NY 11530

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THE DUODECIMAL BULLETIN 6*;

Jens Ulff-Moller came from Copenhagen, Denmark, in November to address DSA members at Nassau Community College.. *(See page 10)*

Volume 35;
Number 1;
1192
11*0;

THE DOZENAL SOCIETY OF AMERICA

(Formerly: The Duodecimal Society of America)

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

Membership dues are $12.00 (US) for one calendar year. Student Membership is $3.00 per year, and a Life Membership is $144.00 (US).

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BOARD OF DIRECTORS OF THE DOZENAL SOCIETY OF AMERICA

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THE DUODECIMAL BULLETIN

Whole Number Six Dozen Dek

Volume 35; Number 1;

11*0;

FOUNDED 1944

IN THIS ISSUE

DOZENAL SOCIETY OF AMERICA
MINUTES OF THE ANNUAL MEETING -- 119#;

Saturday, October 19, 1991
Nassau Community College
Garden City, LI, NY 11530

I BOARD OF DIRECTORS MEETING

1. Gene Zirkel, Board Chair, opened the meeting at 1:15 p.m. The following Board Members were present: Alice Berridge; Jamison Handy, Jr.; Fred Newhall; Gene Zirkel; Dr. Patricia Zirkel.

   All expressed concern about the health of absent Member James Malone and wished to extend regards from the Board.

2. The Nominating Committee (J. Malone, L. Aufiero, J. Schiffman) was not able to present a report. The Board therefore agreed to elect the current slate of Officers, pending approval from those yet uncontacted:

Board Chair	Gene Zirkel
President	Fred Newhall
Vice President	Alice Berridge
Secretary	Larry Aufiero (declined)
Treasurer	Anthony Catania

   The slate was elected unanimously. [*All have accepted, except as noted.* -Ed.]

(Continued)

The DSA does NOT endorse any particular symbols for the digits ten and eleven. For uniformity in publications we use the asterisk (*) for ten and the octothorpe (#) for eleven. Whatever symbols are used, the numbers commonly called "ten", "eleven" and "twelve" are pronounced "dek", "el" and "do" 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 the semi-colon, or Humphrey point, as a unit point for base twelve.

Thus 1/2 = 0.5 = 0;6.

3. Appointments were made to the following DSA Committees:

   Annual Meeting Committee: Dr. Barbran Smith, Chair; Anthony Catania, Anthony Razziano, Larry Aufiero (declined).

   Awards Committee: Gene Zirkel, Chair; Dr. John Impagliazzo, James Malone, Dr. Patricia Zirkel, Dr. Angelo Scordato (declined).

   Finance Committee: Anthony Razziano, Chair; Anthony Catania, Dudley George, James Malone, Larry Aufiero (declined), Dr. Angelo Scordato (declined).

[*All have accepted, except as noted.* -Ed.] Volunteers to these Committees are welcome at any time.

4. The following other appointments were made:

   Editor of the Duodecimal Bulletin: Dr. Patricia Zirkel.

   Parliamentarian to the Board Chair: Dr. Patricia Zirkel.

   Reviewers of articles for the Bulletin: Anthony Catania, Jamison Handy, Jr., Dr. John Impagliazzo, Kathleen McKiernan, Fred Newhall, Dr. Barbran Smith, Gene Zirkel.

5. Other business of the Board:

   Gene said that because of the short supply of our pamphlet "An Excursion in Numbers," that this will need to be reprinted. In addition, our supply of Brochures is also running out. It was agreed to reprint both of these items without major editing.

   Gene announced that Professor Jens Ulff-Moller, of Copenhagen, Denmark, will address the Society and others at Nassau Community College on Novenber 7, 1991 in Building V at 4 p.m. The presentation is being co-sponsored by the DSA, and the Mathematics and Computer Science and History Departments of NCC. Professor Ulff-Moller (who has been cited previously in Bulletins 68; p. 16; and 69; p. 1#) will speak about our ancestors' "long hundred" or ten dozen.

   Gene also mentioned that the DSA is mentioned in the text, Elementary Number Theory by Underwood Dudley. Chapter 14_{10} is entitled "Duodecimals." Gene said that he will attempt to contact the author. A motion was approved to purchase a copy of the book for the Society archives.

   It was also mentioned that Omni Magazine printed a special Twelfth Anniversay Quiz in their issue of 6/19/91.

(Continued)

The Board meeting was adjourned at 1:50 p.m.

President Fred Newhall looks on as Board Chair Gene Zirkel explains a point at the 1991 DSA Annual Meeting, Saturday, October 19, 1991.

II ANNUAL MEMBERSHIP MEETING

1. DSA President Fred Newhall gavelled the meeting to order at approximately 1:50 p.m.

   In addition to the Board members listed above, the following Society members were present: Vera Sharp Handy, Mary Newhall, Jay Schiffman.

2. Gene Zirkel moved to accept the minutes of October 13, 1990. So approved.

3. President's Report - Fred Newhall

   Fred's remarks included the information that carbon has 12 electrons and is fundamentally necessary for life. He added that there are 12 fundamental particles for the universe: 6 quarks and 6 liptons.

   In addition, Fred mentioned that interest in the Society continues and that several overseas requests (from India, Ghana and Nova Scotia) have been received in the past year. He said that there were 90 different requests for

(Continued)

literature. He added that the Society has 13 new members, bring the total roster of members both living and dead to 553.

Fred said that he continues to work on his book, which explains the diverse uses and adaptations of base twelve, and that there are now 1116 pages.

Fred mentioned a new explanatory flyer, and Gene explained that this was prepared by him for our members who are employed in academe. Frequently questions about the Society arise as part of promotion and tenure actions, and the flyer was prepared in order to provide a succinct description of the DSA and its purposes.

Fred and Gene presented a copy of a new brochure being prepared by Arthur Whillock of the Dozenal Society of Great Britain. Input and comment was solicited from those present about the content of the brochure.

President's Appointments:

Parliamentarian to the President: Dr. Patricia Zirkel

4. Treasurer's Report - Anthony Catania

   Tony submitted copies of the 10/15/88, 10/14/89, 10/13/90 and the current 10/18/91 report. A list of paid members was also attached.

   It was noticed that the largest expenditure is the publication of the Bulletin, and that the net worth of the Society at $16,998.72 is about $420 less than last year and is about the same as in 1988.

   The members expressed praise and thanks to Tony Catania for his good work, and the Report was accepted and approved by those present.

   It was noted that the Finance Committee would be encouraged to consider the three items listed in the Minutes of 10/13/90 (Volume 34; Number 1; page 7).

5. Editor's Report - Dr. Patricia Zirkel

   Members praised and thanked Pat for her usual exemplary work for the Bulletin.

(Continued)

The idea of a day with two dozen hours - one dozen hours of day and one dozen hours of night - originated in Egypt.

Pat has engaged the services of a computer compositor -- that is, the layout for the Bulletin is now done by an outside vendor. This computer layout service costs approximately $400 per issue and printing costs an additional $600 per issue; therefore each Bulletin is costing the Society approximately $1,000.00. Pat is pleased with this new service and members expressed their approval of the appearance of the Bulletin.

The Editor said that she has a supply of shorter articles but lacks lengthier articles.

Pat said that she planned three issues in 1992, with the third devoted to the Agenda for the 1992 Annual Meeting and also to the Index for the current Volumes. After 1992 her intention is to produce only two Bulletins per year, due both to costs (as outlined above) and her faculty position, which is very demanding.

Discussion ensued as to the feasibility of producing only two Bulletins in 1992. It was decided and approved to print two issues in 1992, neither of which is to include the Index or Annual Meeting Agenda. The Index will be produced by Fred Newhall in a manner such that it can be bound into the usual volume format. Copies of this Index will be distributed to the membership upon request. The Annual Meeting Agenda will be produced separately and distributed to those members who might attend the meeting.

The Editor expressed her anxiety that a new Editor be brought on board, as her other duties are becoming increasingly demanding, and she is fearful that at some point the production of the Bulletin might have to cease.

(Continued)

6. Committee Reports

Annual Meeting Committee - Dr. Barbran Smith

Members expressed thanks to Barbran for her work in organizing and preparing this meeting.

It was agreed to hold a meeting of the Board of Directors on June 6, 1992.

It was further agreed to hold the next DSA Annual Meeting on Saturday, October 17, 1992, at noon.

7. Awards Committee - Gene Zirkel

Gene announced that the Ralph H. Beard Memorial Award will be presented to Donald Hammond of the Dozenal Society of Great Britain, Editor of their Dozenal Journal for more than one half dozen years. (See related article, this issue.)

Gene also announced that the following persons had been named Fellows of the Dozenal Society of America:

> Anthony Catania, for his long and untiring service as Treasurer of the DSA;
>
> Robert R. McPherson, for his ongoing work at the University of Florida, Gainesville, for the Society and on dozenals in general;
>
> Dr. Barbran Smith, for her ongoing devoted assistance in preparing the DSA Annual Meetings.

8. Nominating Committee

Due to the illness of James Malone, the Committee was unable to put forward a slate. Therefore, Gene proposed that we temporarily elect the Class of 1991 (Anthony Catania, Carmine DeSanto, Dr. Angelo Scordato, and Dr. Patricia McCormick Zirkel) as the Class of 1994. The slate was elected unanimously. [*Dr. Angelo Scordato subsequently declined.* -Ed.]

The following members were elected to the Nominating Committee for the coming year: Fred Newhall, Jay Schiffman, Larry Aufiero (declined).

The meeting was adjourned at 2:50 p.m.

Respectfully submitted,
Alice Berridge

(Continued)

Mary and Fred Newhall (top) and Jamison and Vera Handy (bottom), with the Dozenal Panda.

(Continued)

The Babylonians of Mesopotamia established the time measures of five dozen seconds to one minute and five dozen minutes to one hour.

III FEATURED SPEAKER

Jay Schiffman, a faculty member at Camden County College Extension Center (NJ) gave a brief presentation which referred to Charles Ashbacher's "Base Twelve Crossnumber Puzzle" in Volume 34; Number 2; page 1#. Jay said that he had found the puzzle interesting and challenging but that he had developed an alternate solution which did fit the stipulations of the puzzle-maker. Members found Jay's discussion and analysis to be very interesting.

Jamison Handy spoke to the group about an alternate analysis of "A Cryptarithm - A Puzzle" from Volume 34; Number 1; page 1#. He also discussed his own variation of the Binary Coded Digits which had been expounded in the same issue of the Bulletin. Members were intrigued by both items discussed by Jamison.

Jay Schiffman, Alice Berridge and Gene Zirkel are shown at the luncheon which followed the 1991 DSA Annual Meeting. Alice organized the event, which was held at the Long Island Marriott Conference Center. □

Period or Semi-Colon?

The Egyptian formula for the area of a circle used a value that implied that π was 3.16. (Coincidentally π is about 3;16.)

A DOZEN DECADES:

A Report on a Lecture About

Long Hundreds and Historical Methods

On Thursday, November 7th, the Dozenal Society of America, in conjunction with the departments of Mathematics/Computer Processing/Statistics and of History at Nassau Community College (LI) sponsored a lecture by Jens Ulff-Moller, PhD candidate from the University of Copenhagen. Last year Jens, on very short notice, gave a brief presentation which touched upon some of the problems translators face when trying to interpret numerical data in medieval documents, especially as they relate to the 'long hundred'. He cited texts from the fifth, eighth and even the seventeenth century.

Expanding on his previous talk, this lecture acquainted us with some of the methods researchers use to clarify the meaning of numbers in texts.

Using overhead transparencies to illustrate many points, Jens spoke about the confusion caused by words like 'hundred' or 'thousand' when translating early documents. It seems that our ancestors sometimes used such words to mean 100[1] and 1000, and at other times they meant 120 and 1200. Today these are called the *short* hundred or thousand, and the *long* hundred or thousand, respectively.

He explained that sometimes an author used expressions such as 'one hundred twelve count'. In these cases it is easy for the translator to recognize that the number is one dozen decades, and not ten squared. Of course, the reason a writer would so modify the word 'hundred' is because the readers were aware of two different uses of the word and they would need the clarification to comprehend what was being said.

In other instances there are internal messages such as a reference in an Icelandic manuscript to: "One hundred men served as soldiers, eighty stayed and forty left". (Jens pointed out that translators not aware of the common use of the long hundred might mistakenly conclude that this was an arithmetic error!)

(Continued)

Similarly, in another place we find a citation that refers to fifteen score, one quarter of a thousand, or 300 - a confusing mixture of a long thousand with a short hundred. (A long thousand of 1200 is one dozen short hundreds or ten long hundreds.)

He explained some of the ways that historians attempt to decipher perplexing numbers in a document, including the fact that many times there may be no way to figure out which 'hundred' was meant.

One method that can be used to decipher the author's meaning is to find references to known quantities such as the 532 year Easter cycle in the Icelandic text, Alfredi: Rimtol. This cycle has been variously referred to as:

a) *Four hundred twelve counted, and two on the way to sixty.* (This is equivalent to 4 x 120 + 50 + 2, as 'on the way to sixty' means counting in decades passing the previous decade of fifty, but not yet reaching sixty.)

b) *Four hundred twelve counted and forty and one dozen*, (or 4 x 120 + 40 + 12).

c) *Two on the way to forty on the way to six hundred.* (2 + 30 + 500. As before, 'on the way to forty' means 30, while on the way to 600 indicates 500.)

In most texts numerals were not used, but the words for numbers were written out. Notice that in (a) and (b) the long hundred is used, but in (c) it is the short hundred.

In another place a year is referred to as '*CCC nights and V nights*'. In both England and in Scandinavia the Roman Numeral C was used ambiguously for both types of hundreds. In this case, it refers to 3 x 120 + 5 or 365 nights in a year. (Again, a translator who is ignorant of the use of C to sometimes represent the long hundred, might erroneously conclude that the author didn't know the correct length of the year.)

In the discussion that followed Jens' provocative talk, an analogy was made to our present use of the word 'ton'. There is the long ton, the short ton, the metric ton, and a couple of nautical tons that measure volume rather than mass!

Jens pointed out that logical people, particularly the Germanic tribes, would prefer to count and measure with a unit and then a unit squared, that is -- either 10 and 100 or else 12 and 144. However, our ancestors were not always logical. Sometimes they were just practical. They couldn't calculate very well, and division was especially difficult. Ten as a unit most probably comes from the biological accident that we have ten fingers. However, one third of 100 or of 1000 is not convenient - hence they devised the long hundred and the long thousand.

Jens noted that our four fingers have three joints, and so hand counting is just as easy in duodecimals as in decimals with the added factor that one can count up to two dozen by using the thumb as a pointer. Of course the reason that twelve is so often used is the fact that it has many factors, and hence division can be performed without using fractions.

(Continued)

All in all, the lecture was informative and interesting, and we have learned to sympathize with some of the difficulties with which the historian is faced. We thank Jens for sharing the efforts of his doctoral research with us.

-Alice Berridge & Gene Zirkel

(L-R) Dr. Michael Steuer, David Rothstein, Jens Ulff-Moller, Professor Alice Berridge and DSA Board Chair Gene Zirkel are shown following Jens' presentation at Nassau Community College in November.

[1]All numbers in this article are decimal. □

Q & A

One of the weakest arguments put forth by proponents of the awkward decimal metric system is that the US should use the same system as the rest of the world does.

Question:How many Countries use some form of a decimal based metric system?
Answer:Four dozen and nine.

Question:How many variations of the metric system do they use?
Answer:Four dozen and nine!

Question:Why don't we adopt THE decimal metric system?
Answer:Which one? Canada's? Great Britain's? Japan's? Etc.?

(Source: "No case has been made for metric," The American Metric Journal, Jan/Feb 1989, page 2.)

RE: The Duodecimal Bulletin (ISSN 0046-0826)

R.E. McPherson
Gainesville, FL

Decimal 46,082 identifies uniquely the title The Duodecimal Bulletin. The check digit 6 is undecimal, not decimal; i.e., the check digit is eleven-valued, not ten-valued. The eleventh value is X.

Specifically, $\sum id_i \equiv 0$ mod el.

i	8	7	6	5	4	3	2	1
d_i	0	0	4	6	0	8	2	6
id_i (mod el)	0	0	2	8	0	2	4	6,

$\sum id_i \equiv 1* \equiv \# \equiv 0$ mod el

Now, ISSN means International Standard Serial Number. If, disregarding format hyphens, spaces, and such, ISSN 0046-0826 is to represent a number, mathematically, then what is that number?

Is it, decimally, (46,082)(11) + 6? i.e., decimally, 506908?

$$\begin{array}{r} 46082 \\ 46082 \\ \hline 506902 \\ +6 \\ \hline 506908 \end{array}$$

And, duodecimally, (22802)(#)+6? i.e., duodecimally, 205424?

In brief, is an ISSN properly to be regarded as a mixed-base numeral?
Note the following:

(Continued)

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

12)46082	
)3840	2
)320	0
)26	8
)2	2
0	2

X)$22^{6}802$	
)$28^{2}0^{4}0$	2
)$32^{8}4$	8
)3X	0
)4	6
0	4

022802
#

20541X
+6

205424

X)$20^{4}5^{3}424$	
)$25^{9}4^{2}0^{4}2$	8
)$2E^{5}2^{2}5$	0
)$36^{2}2$	9
)42	6
)5	0
0	5

□

HOW I FOUND THE OLDEST BOOK ON DOZENS

Fred Newhall
Smithtown, NY

The "earliest substantial book on the subject (duo-decimals) in the English language" according to F. Emerson Andrews, was published in 1866. Written by Thomas Leech, E.C.S., it has the prolonged title Dozens vs Tens or The Ounce, The Inch, and The Penny considered as Standards of Weight, Measure, and Money, and with a reference to a Duo-decimal Notation. (Take a breath). It is a hard-cover book of 51 pages, and was published by Robert Hardwiche, London, printed by Spottiswood & Co., New-Street Square, London. (Take another breath).

When I tried to obtain this book through our Inter-Library System, I was told that the only copy as in the Columbia University Library (N.Y. City), and was not allowed to be circulated. This made me all the more curious to see it, so I took a special trip by LIRR and IRT subway to the Morningside Campus, a thrilling experience in itself!

The immense lettering COLUMBIA UNIVERSITY LIBRARY is bas-reliefed in stone atop an impressive columned structure with at least 3 flights of marble steps across its entire front. In the ornate lobby is a small sign "Information, Room 316", so I climbed 2 more 16-foot flights only to be told that this is no longer the library!

The new (50 year old) Butler Library is across the university quadrangle. A security guard at the door asks for credentials, and I was directed to the 3rd floor again to the reference room where the card catalog lists the book in the Dale Collection of the Rare Books Department on the 6th floor. This time I took the elevator! In the beautiful new and efficient Rare Books area, I was asked to fill out a card, and was told to wait in the Corliss Lamont Reading Room, which is a large glass-walled "clean-room" -- perfectly air-conditioned. A while later the book was ceremoniously presented on a foam pillow with a purple velvet book mark, no kidding! You are allowed to turn the pages, but only hold them open with the velvet book mark.

Considering that this book is a pioneering work written 125 years ago, it is a remarkable advocacy of the duodecimal system. Mr. Leech uses ŧ for ten and e for eleven, and emphasizes practical uses such as money:

10	mites or twelfthings	1 doit	=	2	pence
100	mites or twelfthings	1 florin	=	2	shillings
1000	mites or twelfthings	1 victoria	=	24	shillings

Standards:

He has other conversion standards of length - foot or yard; area -sq. foot or sq. yard; surface - centiare (an are being 100 sq. meters); and weight - pound or gram.

(Continued)

His repeating decimals are written .333333 = .3 and 1/5 is written .2497. He had a few curiosities. He coined the words "tennish" and "twelvish". He mentioned a Maltese family having 6 fingers on each hand. He coined the word "Cubion" for the cube of twelve, the next step above gross.

Instruction:

The book instructs the reader in addition, subtraction, multiplication and division and the conversion of decimals: to convert decimal to duoodecimal, divide by 12 continuously; to convert duodecimal to decimal, divide by 10 continuously (in base twelve!).

Appendices:

From page 43 on, is an appendix showing: % conversion:

1 percent = 1 + e/21 pergross, and 1 pergross = 25/36 percent.

M = $\log_{1}$ e = ;49e494944399

Constant e = 2.8752360694

Log 10 (i.e. log twelve to base twelve) = 1.

He also gives tables of log primes and logs from eee00 to 100 000 (in which Mr. Andrews detected inaccuracies and encouraged Mr. Terry to compile his elaborate log tables, which led to his comprehensive volume of many tables). A temperature chart converts duodecimal to Fahrenheit and to a novel Fahrenheit scale with 0°F as the freezing point, an idea I have never seen before.

The embossed leather binding of the book is nearly torn off, and the yellowed pages might be apt to shatter if flattened for xeroxing, but it might be worth the chance to preserve the printing now by duplicating instead of waiting until the pages become too brittle later. This, of course, would be the decision of the librarians who are better qualified to judge the book's condition. However, it would be important to have a copy of this earliest duodecimal book for the Dozenal Archive Room of Nassau Community College Library to round out our collection.

I admire Mr. Thomas Leech first for having made himself knowledgeable about dozenals, and then for having the spirit to write an instructive book and have it published. All of this during difficult times 125 years ago. He deserves an important place among our founders.

□

"Each one teach one."
-- Ralph Beard, Founder of the DSA

A NOTE ON SUPERPRIMES

Jay L. Schiffman
Camden County College Extension Center
Camden, NJ

In the latest issue of the DSGB's Dozenal Journal [1] Charles Ashbacher refers to Shaun Ferguson's question re 'Superprimes': Could anyone find 'superprimes' (in any base) where, the prime being abcd, a, ab, abc, and abcd are all prime. Shaun added two stipulations to the original question, which were: (i) there should be no repetition of digits in the number, i.e. a = b = c [Sic. This should have read a = b, c, d; b = c, d; c = d - Ed.] and (ii) a, b, c, and d are also prime digits (not including 1).

Here are three solutions in the duodecimal system. We observe that the last digit for a duodecimal prime must be 1, 5, 7, or #;. In light of the fact that the digit 1 is excluded, the only values permissible for d are 5, 7, or #;. The non-repetitive character of the digits a, b, c, and d further reduces our search. There are six dozen possibilities.

If d = 5, then abcd could be:

2375;	23#5;	2735;	27#5;	2#35;	2#75;
3275;	32#5;	3725;	37#5;	3#25;	3#75;
7235;	72#5;	7325;	73#5;	7#25;	7#35;
#235;	#275;	#325;	#375;	#725;	#735;

If d = 7, then abcd could be:

2357;	23#7;	2537;	25#7;	2#37;	2#57;
3257;	32#7;	3527;	35#7;	3#27;	3#57;
5237;	52#7;	5327;	53#7;	5#27;	5#37;
#237;	#257;	#327;	#357;	#527;	#537;

If d = #;, then abcd could be:

235#;	237#;	253#;	257#;	273#;	275#;
325#;	327#;	352#;	357#;	372#;	375#;
523#;	527#;	532#;	537#;	572#;	573#;
723#;	725#;	732#;	735#;	752#;	753#;

The three solutions satisfying all the conditions of the problem are 3#75;, 35#7;, 375#; as will now be verified.
Consider:

(Continued)

3#75; = $(3x12^3) + (11x12^2) + (7x12) + (5x1)$ = 5184 + 1584 + 84 + 5 = 6857 decimally (prime).

3#; = (3x12) + (11x1) = 36 + 11 = 47 decimally (prime).

3#7; = $(3x12^2) + (11x12) + (7x1)$ = 432 + 132 + 7 = 571 decimally (prime).

Also observe that 3, #;, 7, and 5 are all distinct primes. Hence 3#75; is a superprime in the sense described above.

Consider next:

35#7; = $(3x12^3) + (5x12^2) + (11x12) + (7x1)$ = 5184 + 720 + 132 + 7 = 6043 decimally (prime).

35; = (3x12) + (5x1) = 36 + 5 = 41 decimally (prime).

35#; = $(3x12^2) + (5x12) + (11x1)$ = 432 + 60 + 11 = 503 decimally (prime).

Also observe that 3, 5, #;, and 7 are all distinct primes. Hence 35#7; is a superprime in the sense described above.

Consider finally:

375#; = $(3x12^3) + (7x12^2) + (5x12) + (11x1)$ = 5184 + 1008 + 60 + 11 = 6263 decimally (prime).

37; = (3x12) + (7x1) = 36 + 7 = 43 decimally (prime).

375; = $(3x12^2) + (7x12) + (5x1)$ = 432 + 84 + 5 = 521 decimally (prime).

In addition, 3, 7, 5, and #; are all distinct primes. Hence 375#; is a superprime in the sense described above.

The reader can check that the other 59; cases fail to satisfy all the conditions of a 'superprime' described above. The reader is invited to fine 'superprimes' in other bases satisfying these constraints.

REFERENCE

[1] Superprimes. The Dozenal Journal, The Dozenal Society of Great Britain, Number 8, Spring 1990, p2#;.

Solution to A Base Puzzle (Volume 34; Number 3; page 11;)

Jean Kelly
New York, NY

Three digit numbers which are equal to the sum of their digits multiplied by 11 (the base + 1) in bases through do-one are:

Base	Number		
2	110 = (1+1+0) x (11)	or	6 = 2 x 3
3	121 = (1+2+1) x (11)	or	14 = 4 x 4
4	132 = (1+3+2) x (11)	or	2* = 6 x 5
5	143 = (1+4+3) x (11)	or	40 = 8 x 6
6	154 = (1+5+4) x (11)	or	6* = * x 7
7	165 = (1+6+5) x (11)	or	80 = 10 x 8
8	176 = (1+7+6) x (11)	or	*6 = 12 x 9
9	187 = (1+8+7) x (11)	or	114 = 14 x *
*	198 = (1+9+8) x (11)	or	146 = 16 x #
#	1*9 = (1+*+9) x (11)	or	180 = 18 x 10
10	1#* = (1+#+*) x (11)	or	1#* = 1* x 11
11	1C# = (1+C+#) x (11)	or	240 = 20 x 12 {Where C represents the dozenth digit in base do-one}

Generalizing, we see that in base b, the number formed by the three digits 1, b-1, and b-2

is equal to the sum of its digits [1 + (b-1) + (b-2)] times 11 (or b+1). This is always true because the number proposed represents

$$(1)(b^2) + (b-1)(b) + (b-2) \text{ or } 2b^2 - 2$$

while the product [1 + (b-1) + (b-2)] x (b-1) is also $2b^2 - 2$.

Q.E.D.

DSA SEAL PUZZLE #1

Part A: Divide the face of a clock into three parts with two straight lines so that the sums of the numbers in the three parts are equal.

Part B: If you use the Society's Seal (found on the front cover of this Bulletin) can you divide it into three such parts having equal sums? Can you divide it into two parts with equal sums?

DOZENAL JOTTINGS

...from members and friends...News of Dozens and Dozenalists...

DONALD HAMMOND, Secretary of the DSGB, wrote to thank the DSA Board of Directors for conferring upon him the Ralph Beard Memorial Award. He says: "Whatever may happen in the future, I shall always continue to support and advocate the supremacy of the dozenal base for arithmetic as the foundation needed for an enlightened numeracy. Please accept not only my thanks, but also my best wishes for the vitality of the DSA in the years to come. Long may you flourish!" . . .

DUDLEY GEORGE (CA) wrote to send best wishes on the occasion of the 1991 DSA Annual Meeting. He and his wife had just moved to a new apartment complex -- otherwise he had intended to attend the meeting. We look forward to seeing them at the next meeting . . .

PAUL SCHUMACHER (NJ) sent a number of his deceased father's papers to the DSA. These included valuable back issues of early Duodecimal Bulletins, correspondence on the subject of dozenals from the early '50's, and some notes which his father, WILLIAM C. SCHUMACHER, had prepared. Our thanks to Paul . . .

MICHAEL BURKE (New Zealand) wrote to tell us the following story: "I had a letter published in a technical journal in which I told of manufacturing a structural engineering truss from a continuous roll of sheet material in a single [continuing] operation; and I asked if anyone was interested. I thought, just possibly, there would be one, or maybe two replies. There were a flood of them! So many that I couldn't possibly answer each one in detail and individually. So I was forced to write a small book of instruction, with patterns and numerous illustrations, that would enable anyone to duplicate a demonstration model." We wish him success . . .

Welcome to new members:

320; **KELLY GENE WILLIS** Wise, VA

Kelly is a student at Clinch Valley College and writes: "...I also have a strong interest in the metric system. I realize that base twelve is superior to base ten, but I also see the need for a measurement system on a single base. I have been thinking on my own do-metric system, using base metric units, but prefixes altered to base 12. thus a kilometer in duodecimals would be longer than a mile . . . . Thanks for being around. I'm glad to see that I'm not the only one!"

321; **MARY JANE NEWHALL** Smithtown, NY

Mary is the wife of our President, Fred Newhall, but she had never joined the Society on her own. She is a faithful attendee at all Society meetings.

(Continued)

PALINDROMES

Shaun Ferguson
Dozenal Society of Great Britain

I recently came across Mathematical Circus by Martin Gardner which contained articles I remember reading years ago when I had a subscription to Scientific American and some of which I replied to at the time.

On page 245, referring to palindromic numbers, Gardner mentions Simmons' conjecture that there are no palindromic numbers of the form X^k where $k > 4$. We don't need to look far to find examples that disprove this statement as it stands; to make it correct, one needs to add the rider "in base ten". We can use Pascal's triangle to find powers of "11", and as far as 11^4 in base ten we can just copy the figures - "14641"; in the next line we have, in base ten notation, 1,5,10,10,5,1 - and 11^5 is not palindromic in base ten.

Switch to base eleven or twelve, however, in which ten is a single digit, and "11^5" = "15**51", a palindromic number. Which in turn implies that powers of "11" can always be palindromic if you pick a large enough base in which to express your numbers.

If [x] stands for "integer x" and ${}^nC_r$ for the Combination of r items at a time from n (i.e. coefficients in the Pascal Triangle and elsewhere) then:

11^n will be palindromic in any base r, where $r > {}^nC_{[n/2]}$. □

Dozenal Jottings *(Concluded)*

322; **DR. UNDERWOOD DUDLEY** Greencastle, IN

Dr. Dudley is a Professor of Mathematics at DePauw University, and the author of a book Elementary Number Theory which was discussed at the DSA Annual Meeting recently. Dr. Dudley was contacted with regard to the book, and proceeded to join the Society. □

Have you written a letter to some local newspaper or to a newsletter extolling the advantages of Base Twelve? Remember to mention that free literature is available from the Society.

DID JAPAN COME BACK? SOME FURTHER NEWS

Recently the *American Metric Journal* reported that Japan had re-legalized non-metric units. We passed this "news" along to our readers in our last issue of the Bulletin.

But, since that time we have found nothing in the *NY Times*, nor in other periodical indices reguarding these developments.

On the other hand, the Research Division of the Japan Trade Center in New York, responding to a telephone call, said that a conference or council on measuring units administration has come up with two recommendations:

1. To adopt SI for certain units. (We fear that this may actually be stricter, since Japan has in the past veered away from strict SI in some instances.)
2. To allow parallel usage of two different measuring systems in some instances (such as allowing the importing of a machine that is graduated in inches provided that it is also marked in SI).

No bill has been passed by the Japanese Diet, in fact no proposed bill has even been written.

If any of our readers have any further information on this matter, we would appreciate hearing from them. Thanks very much! □

Remember -- your gift to the DSA is tax deductible.

* THE HALLS

Jean Kelly

0, it *dozen* matter what U 8 last No#; *it7tually* going 2 B OK.

4get yes2day. Live 4 2day.

I calcul8 that I've 1 sufficient 10 to buy a dozen roses.

There R many crazies and 6 in this world - B careful.

Enu5 had enough! This is Bcoming assi9; it's just 200.

Some people react to this humor *wi3vulsion*.

□

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, man'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.

In a related development, man 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, that base should be used which is the most advantageous, and best suited to the work involved. We expect that duodecimals will 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.

□

COUNTING IN DOZENS

1	2	3	4	5	6	7	8	9	*	#	10
one	two	three	four	five	six	seven	eight	nine	dek	el	do

Our common number system is decimal—based on 10. The dozen system uses twelve as the base, which is written *10*, and is called *do*, for dozen. The quantity *one gross* is written *100*, and is called *gro*. *1000* is called *mo*, representing the meg-gross, or great-gross.

In our customary counting, the places in our numbers represent successive powers of ten; that is, in 365, the 5 applies to units, the 6 applies to tens, and the 3 applies to tens-of-tens, or hundreds. Place value is even more important in dozenal counting. For example, *265* represents *5* units, *6* dozen, and *2* dozen-dozen, or gross. This number would be called *2 gro 6 do 5*, and by a coincidence, represents the same quantity normally expressed as 365.

We use a semicolon as a unit point, thus two and one-half is written 2;6.

Place value is the whole key to dozenal arithmetic. Observe the following additions, remembering that we add up to a dozen before carrying one.

94	*136*	Five ft. nine in.	*5;9'*
31	*694*	Three ft. two in.	*3;2'*
96	*3#2*	Two ft. eight in.	*2;8'*
19#	*1000*	Eleven ft. seven in.	*#;7'*

You will not have to learn the dozenal multiplication tables since you already know the 12-times table. Mentally convert the quantities into dozens, and set them down. For example, 7 times 9 is 63, *which is* 5 dozen and 3; so set down *53*. Using this *"which is"* step, you will be able to multiply and divide dozenal numbers without referring to the dozenal multiplication table.

Conversion of small quantities is obvious. By simple inspection, if you are 35 years old, dozenally you are only *2#*, which is two dozen and eleven. For larger numbers, keep dividing by 12, and the successive remainders are the desired dozenal numbers.

```
12)365
 12)30 + 5
  12)2 + 6
     0 + 2   Answer: 265
```

Dozenal numbers may be converted to decimal numbers by setting down the units figure, adding to it 12 times the second figure, plus 12^2 (or 144) times the third figure, plus 12^3 (or 1728) times the fourth figure, and so on as far as needed. Or, to use a method corresponding to the illustration, keep dividing by *, and the successive remainders are the desired decimal number.

Fractions may be similarly converted by using successive multiplications, instead of divisions, by 12 or *.

For more detailed information see *Manual of the Dozen System* ($1;00).

DETACH HERE -- OR PHOTOCOPY

We extend an invitation to membership in our society.
dues are only $12 (US) per calendar year; the only requirement is a constructive interest.

Application for Admission to the Dozenal Society of America

Name ______________________________
LAST FIRST MIDDLE

Mailing Address (for DSA items) ______________________________

____
(See below for alternate address)

Telephone: Home ______________ Business ______________

Date & Place of Birth ______________________________

College ______________ Degrees ______________

Business or Profession ______________________________

Annual Dues .... $12.00 (US)

Student (Enter data below) .... $3.00 (US)

Life .... $144.00 (US)

School ______________________________

Address ______________________________

Year & Math Class ______________________________

Instructor ______________ Dept. ______________

Other Society Memberships ______________________________

____

Alternate Address (indicate whether home, office, school, other)

____

____

____

Signed ______________ Date ______________

My interest in duodecimals arose from ______________________________

____

____

Use space below to indicate special duodecimal interests, comments, and other suggestions, or attach a separate sheet:

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