THE DOZENAL SOCIETY OF AMERICA
c/o Math Department
Nassau Community College
Garden City LI NY 11530-6793

= ATTEND OUR ANNUAL MEETING - SATURDAY 14;(16.) OCTOBER 11*7(1999.) =

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THE DUODECIMAL BULLETIN

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See Page 16;(18.)

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Number 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 $12.00 (US) for one calendar year. Student Membership is $3.00 (US) per year, and a life Membership is $144.00 (US).

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THE DUODECIMAL BULLETIN

Whole Number 7#; (Seven Dozen El)

Volume 3#; (3 Dozen El)

Number 2;

*11*7;*(1999.)

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IN THIS ISSUE

MINUTES OF THE ANNUAL MEETING

Saturday, 15; October 11*6 (10/17/98)
Nassau Community College, Garden City, NY

The meeting opened at 10:30 AM.

Attendance: Christina Scalise, Professors Alice Berridge, John Earnest, Dr. John Impagliazzo, Jay Schiffman, Gene Zirkel.

FEATURED SPEAKER

Professor John Earnest explained how to construct a Web Site. John had done a search and found several articles on dozenals, as well as numerous dozenal sources. He very easily found over three dozen references, many from DSGB members. He explained the nomenclature and the procedures to follow. He explained the function of a Web Master and how to become linked to other Web pages as well as how to build one exclusively for DSA. Christina suggested that we publicize (through the L.I. student math league as well as other places) a contest for students to "Design a Dozenals Home Page." She said that students value winning this kind of contest as a nifty item for their college applications. It was suggested that we install our publications, such as *An Excursion in Numbers,* the Tables of Contents of our Bulletins, as well as other items on a Web Site. This might eliminate the need for expensive reprints. John Impagliazzo said he could probably get Hofstra University to agree to create one Web page and we could set up a link to the Web Site. Other institutions, such as Nassau Community College, could link to the Hofstra Web Page. Christina said that she would check out information, prices etc., for creating the Home Web Site. Gene said he would begin to design the initial page to get us started. Members were very excited about this new option and are very grateful to John Earnest for his expertise. According to John: "You are a Cyberspace Alien, if you are not located on the WWW!"

BOARD OF DIRECTORS MEETING

1. In The absence of Board Chair, Professor Rafael Marino who recently resigned, Vice President Gene Zirkel convened the meeting at 1:00 PM. The following Board members were present: Alice Berridge, John Impagliazzo, Christina Scalise, Jay Schiffman, and Gene Zirkel.

2. The minutes of the meeting of 16; October 11*5 (10/18/97) were approved as published in the Bulletin.

3. The Nominating Committee (A. Berridge, J. Schiffman, R. Marino) presented the following slate of officers which was elected unanimously:

Board Chair:	Gene Zirkel
President:	Jay Schiffman
Vice President:	John Earnest
Secretary:	Christina Scalise
Treasurer:	Alice Berridge

4. Appointments were made to the following DSA Committees:

Annual Meeting Committee: Alice Berridge and Gene Zirkel

Awards Committee: Gene Zirkel, Patricia Zirkel, Jay Schiffman.

Volunteers to these committees are welcome at any time.

5. The following appointments were made:
Editor of the Duodecimal Bulletin: Jay Schiffman
Parliamentarian to the President: Dr. Patricia Zirkel

6. Other Business of the Board:

Members discussed the idea of establishing Student DSA Chapters. Free membership for one year would be extended to new members; an additional free year membership would be granted for students submitting articles; prizes could be awarded for the best articles and all submissions would be considered for publication. In our initial inquiry to high schools we will mention that video tapes are available for program material for Chapter meetings. We will offer chapters back issues of our *Bulletin* and access to the F. Emerson Andrews Dozenal Collection housed in the Nassau Community College Library.

The next Board Meeting will be held on 14; October 11*7 (10/16/99) at 10:30 AM. Details will appear in the next *Bulletin.*

The Board Meeting was adjourned at 1:30 PM.

ANNUAL MEMBERSHIP MEETING

1. President Jay Schiffman gaveled the meeting to order at 1:30 PM.

2. The minutes of the meeting of 16; October 11*5 (10/18/97) were approved as published in the *Bulletin.*

3. Treasurer's Report - Alice Berridge

Alice presented Income Statements for the years 11*6,11*5 and 11*4 for comparison, as well as Membership lists for the last two years and a listing of current members as reflected from the recent membership drive. Last year we gained one new Life Member. Six Life Members, and ten Regular Members made special contributions to the Society amounting to $238; and $84;, respectively. Printing costs are very high and the Society is very grateful to an anonymous member who pitched in to do the layout when our regular excellent person was prevented from doing issue 7*. Without this generous contribution our working capital would be reduced by more than half. The balance as of September 21; was $6*9;. It was agreed that we should redeem the CD at due date to increase the cash flow of the Society.

4. Editor's Report - Jay Schiffman

Jay says work is proceeding nicely for the next issue. He is still anxious to receive articles from readers.

5. Annual Meeting Committee - Alice Berridge

The next Annual Meeting will take place on 14; October 11*7 (10/16/99)

6. Nominating Committee - Alice Berridge

The Committee presented the following slate for the class of 11*9 (2001): Alice Berridge, John Impagliazzo, Robert McPherson, and Gene Zirkel. The slate was elected unanimously.

In addition, Professor Carmine DeSanto was elected to the Class of 11*8 (2000)

to take the place of Rafael Marino who had unexpectedly resigned.

Alice Berridge, Jay Schiffman and Patricia Zirkel were proposed as the Nominating Committee for the coming year. They were elected unanimously.

Dr. Patricia Zirkel was appointed Parliamentarian to the Chair.

7. Other Business:

Bob McPherson had contacted the Board for corrections to his *Certificate of Numeral Equivalence* which he intends to have recorded in the "Alachua County Official Records Book" in Florida. When signed by all, Gene will mail this to Bob.

It was decided to reduce the number of *Bulletins* to be printed in order to reduce costs. We will send out copies of old issues when requests are made for information. Gene said that there have been many requests for materials and general information this past year. He cited numerous articles from DSGB - one item: "The overwhelming majority of the British public prefer UK weights," and articles of this nature. National Metric Week is celebrated in the week containing *; October (10/10) We are in favor of a *reasonable, factorable* metric system, and therefore we will celebrate both National Metric Week and also the twelfth month of the year which we hereby designate as Universal Dozenal Month.

The meeting was adjourned at 1:45 PM.

Respectfully submitted,
Alice Berridge

OUR BRITISH ASSOCIATES

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NUMBERS AND NUMBER SYSTEMS

H. M. Country

Adapted from a presentation to the Meadville [PA] Literary Union, a non--scientific group of business and professional people.

When and how we began to count no one knows for certain. The process which seems so natural, almost automatic, to us developed haltingly among primitive peoples. Until it was realized that there was a 1-to-1 correspondence between 1 finger and, say, 1 goat and between 2 fingers and 1 + 1 goats, and so on, there could be no such thing as counting. For our early ancestors the count never ran very high: even today in some very primitive, isolated tribes counting is limited to "1, 2, 3, many". Large numbers are simply not differentiated or appreciated by them.

As the technique developed, those counting soon ran out of fingers and toes, and in addition often wished for some visual evidence of how their goat herds or other property compared with that of their neighbors. So tallies of one sort or another were invented. These might consist of scratches in the earth, piles of pebbles, knots on a strip of leather or lines scratched on a piece of wood or bone. Each scratch, pebble, or line represented 1 of what ever was being counted. Bone and wood tallies have survived to provide archaeologists and anthropologists with insights on early civilizations. It is worth noting that early humans found, as we do, that more than four identical marks were difficult to comprehend at a glance, and usually they used a distinguishing mark. For every fifth tally. We mark, for example, four vertical strokes and then put a slash through the group as indicated below:

Tally Marks for Groupings of 5 Items

The naming of numbers and the numerals which represent them came much, much later. Four or five thousand years ago (depending upon which authority you wish to believe) the Sumerians and Chaldeans developed a number system and a way to represent these numbers. These representations were marked on soft clay tablets with a wedge--shaped stylus, and for a permanent record, the tablets were baked. Hence, many examples of their arithmetic and business

transactions have come down to us for study. Although the Sumerians chose to count by tens as have so many other cultures, they recognized the advantages of twelve as a base. Since multiples of ten and of twelve meet at sixty (6 tens = 5 twelves), sixty was chosen as a base compatible to both counting bases. There may have been other factors leading to this choice. For example, sixty is evenly divisible by a large number of factors, ten in fact, 2, 3, 4, 5, 6, 10, 12, 15, 20, and 30, providing many convenient fractional parts of the base. Or the fact that these are approximately 360 days in a year may have influenced the choice of sixty as a base.

Many vestiges of their system remain with us today: we buy eggs and cookies by the dozen, there are a dozen dozen in a gross, twelve inches in a foot, sixty seconds in a minute, sixty minutes in an hour, two twelve hour periods in a day, 360 degrees in a circle, and before british coinage went decimal, twelve pence in a shilling. There are also twelve months in a year, but I suspect the moon had much more to do with that than did the Sumerian number system. In German, French, and English (and perhaps in other languages as well) the 2 numbers immediately following ten are given special names. For example, We don't say "one teen" and "two teen" as we do "thirteen, fourteen, ..." The German counts, "... neun, *zehn, elf,* zwölf" before continuing with "dreizehn, vierzehn, ..." This is probably because many created measurements were divided for convenience into twelve parts such as mentioned in the opening sentence of this paragraph.

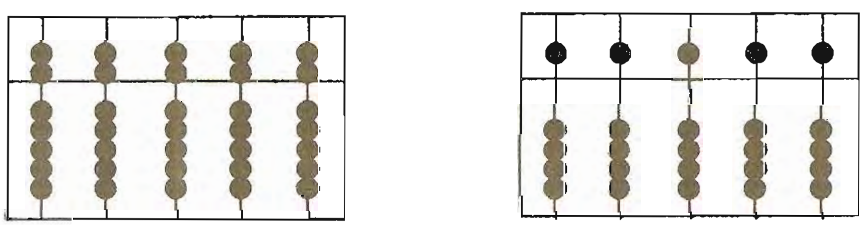
About a thousand years later, more or less, the Egyptians began using pictures to represent numbers. And still later a number of societies, the Greek, the Roman, and the Hebrew among them, chose to use letters of their alphabets to represent numbers. By and large these letter-based systems were awkward to use, and only one, Roman Numerals, finds limited use with us today.

We use Roman Numerals to keep track of kings and popes, in designating the hours on old watches and clocks, in dating copyrights and cornerstones, in the pagination of prefaces of some books, and in keeping track of olympics and superbowls.

Many of the numerical symbols used by the Romans were borrowed, with modifications, from the Greek alphabet by way of the Etruscans. The letters used as numerals today are more familiar and easier to remember. Logically enough "I" represents the unit, 1: "C" is 100 from the latin centum: "M" is

1000 from the latin mille: "V", the Roman five, may represent the open hand and its five fingers, while "X" is ten, possibly two V's one inverted over the other. The "L" for fifty and "D' for five hundred complete the modern Roman digits. Originally the system was strictly additive. Thus the current year, MDCCCCLXXXXVIIII, would be a real challenge to cornerstone engravers. Later a subtractive feature was incorporated: a smaller number preceding a larger was to be subtracted from the latter. Thus 1999 becomes MCMXCIX, a vast improvement. (For some unknown reason the Romans never carried the process a step further, to MIM.) To a limited extent we also use both additive and subtractive numbers on occasion. Do you prefer eight forty-seven or thirteen minutes before nine?

Roman Numerals are adequate for recording numbers, but have you ever tried doing arithmetical operations with them? Addition and subtraction are difficult, multiplication and division even more so. The Romans (or their slaves) and the Greeks, Egyptians and later the Europeans did not use algorithms to perform their calculations. They used calculators! or counting boards for such labors. These counting boards were little more than an extension of finger counting. One form consisted of parallel grooves into which round stones could be put, each groove accommodating just nine stones. If a groove could not accommodate a tenth stone, the groove was emptied and one stone was put into the next groove (we'd call it the tens place). These stones were called "calculi" whence come our words calculate, calculation, calculus, and the like. A variation of the calculi and grooves consists of a number of parallel wires stretched across a frame, each fitted with nine beads. The operation of both types of counting boards is identical, but I want to point out that neither requires the number 0 for its operation.



Varieties of the Abacus

From such 9 bead counting devices the abacus evolved. Some had 5 beads for units and two beads for fives, while others more efficiently used only 4 beads for units.

It is well known that a skilled and dexterous user of these devices can perform arithmetical operations faster than they could be done on the now obsolete electric calculators.

The numerals we use to represent our numbers evolved from those used by the Hindus in India. A single line, either vertical or horizontal, was a logical way to represent 1; 2 horizontal lines represented 2, and it is not difficult to imagine how in recording them in haste they evolved into our 2. In like fashion 3 horizontal lines became our 3. The evolution of our other digits is less clear and no theory seems to explain all cases.

Development of the Numerals 2 & 3

The Hindu characters were adopted by the Arabs and introduced into Europe by the returning Crusaders about the time of the great expansion of Islam. These Hindu-Arabic numerals were not accepted or used in business transactions until much later, Roman Numerals being preferred on the grounds that they were well established and less subject to fraud. The shapes of the symbols often varied a great deal until printing was widely used. Even today the shapes of the characters are still evolving slowly: compare the numerals on your last computerized bill or bank statement with the digits you learned to write in grade school.

The number we call zero was not recognized for many years, and even today it is not accorded the position it merits as the first number. For example, on telephone dials and most calculators it is placed after the 9 instead of before the 1 where it belongs. In numerations systems which represented numbers by letters 0 was unnecessary. To a Roman one hundred was C, one thousand was M. Period. On a counting board or abacus ten or one hundred merely meant that on the second or third wire or groove a bead or stone was displaced from its starting position. Since the addition or subtraction of 0 changed nothing, the average person found no reason to worry about it, and some people found it difficult to understand why placing a 0 after a numeral increased its value ten times.

Two birds and 2 monkeys are certainly not the same, but both share the property of twoness. All collections of pairs of anything also share this property. Triads of any kinds of things share threeness, and so on. All empty collections of any sort share zeroness. In this sense 0 represents a number just as 1, 2 or 3. Not only is it a perfectly good number, it is one possessing some interesting and unusual properties, as we shall see in a moment.

Sometime, somewhere, some Hindu who wished to record the result of a calculation on a counting board invented a symbol to indicate a groove in which there were no counters, a dot called a *sunya* (meaning empty). This symbol migrated to Europe along with the other number symbols by way of Arabia and gradually evolved into the open oblong we now know and call zero. The Arabs called the dot *sifr,* and in Europe the whole Arabic symbol system came to be known by the name of this one symbol. That is how the word *cipher* meaning to calculate came into our language. The word zero came later from the Italian.

Mention has been made that 0 is an unusual number. How unusual? Let's see.

1. The addition or subtraction of 0, even though repeated again and again, in no way alters the value of the original number, a fact understood by those who used numbers only for counting and hence found no justification for the introduction of the "sifr".

2. Regardless of the multiplicand, multiplication by 0 always yields the same result, namely 0. Multiplication by no other number always gives itself as a result.

3. Division *of zero* by any number other than 0 yields the same result — 0 with no remainder, $0 \div n = 0$. It will be remembered that the correctness of a division operation may be checked by multiplying the quotient by the divisor, which should yield the dividend. Thus, the quotient 0, multiplied by any divisor will yield the dividend 0, $0 \times n = 0$, validating the statement made above.

4. Division *by zero* is impossible. For example, what does $1 \div 0 = ?$ Applying the check test just cited the answer to such a division should be a number which when multiplied by 0 gives 1 as a result, $? \times 0 = 1$. There is no such number. Division by 0 is mathematically impossible.

5. Any number other than 0 raised to the zeroth power yields 1. Strange as this may seem, the validity of the statement is easy to demonstrate mathematically, and its acceptance is fundamental to understanding any position-value system of recording numbers such as we actually use.

Our inheritance from the Hindus included not only the numerical symbols, the concept of 0, and useful mathematical methods but also the place-value system of recording numbers, a system which you automatically use whenever you read a numeral such as 3427. At the risk of boring you, I want to review this numeral in terms of place-value. The column immediately to the left of the decimal point indicates how many times the base (ten) raised to the zeroth power is to be added in the second column, the number of times 10^1; the third column, the number of times 10^2; and so on. Thus the numeral 3427 really means

3×10^3	$+ 4 \times 10^2$	$+ 2 \times 10^1$	$+ 7 \times 10^0$	
3×1000	$+ 4 \times 100$	$+ 2 \times 10$	$+ 7 \times 1$	
3000	+ 400	+ 20	+ 7	= 3,427

And that, of course, is what we say when we verbalize such a numeral. (I hope you were taught this in school. I wasn't and was too slow witted to figure it out then. Much of the arithmetic I did by rote could have made sense.) It is in this fashion that the place-value system operates not only for the decimal or base ten, system but for numbers written in other bases as well.

The base ten number system you and I learned in grade school and have consistently used in our everyday counting and calculations is so much a part of our training and thinking that we are often inclined to consider it the only manner of numeration, and it is difficult to conceive of another way of counting or doing arithmetic. The advantages and simplicity of the decimal, place-value system of numerals have been widely recognized and adopted in countries around the world regardless of the language spoken. It constitutes the closest approach to a universal language we have yet created.

There have been repeated proposals to change our counting to the simpler, more logical base twelve — the duodecimal system. In the 18th and 19th centuries King Charles XII of Sweden, Isaac Pittman (inventor of the Pittman shorthand system), and Herbert Spencer (the philosopher) among others advocated the duodecimal system. In 1944 the Duodecimal Society of America was founded to encourage the use of base twelve. In addition to supporting research it publishes the *Duodecimal Bulletin,* provides logarithmic tables and slide rules based on twelve, and proposes a duometric system of weights and measures. In the late 1970s the name was changed to the Dozenal Society of America, perhaps on the grounds that dozenal is more meaningful to the average person than duodecimal.

In addition to the *Bulletin* mentioned above, the Society offers a *Manual of the Dozen System,* and a reprint of F. Emerson Andrew's 1934 *Atlantic Monthly* article, "An Excursion in Numbers" outlining and persuasively supporting the duodecimal system. I invite you to write for and read these items.

The base twelve has more factors — 2, 3, 4, and 6 — than has ten and hence is favored for commercial packaging, since twelve units can be arranged in more ways than ten. Some common, frequently used fractions can be expressed as exact duodecimals instead of repeating decimals, e. g., using a semicolon for the fraction point, 1/3 And 2/3 are 0;4 (four-twelfths) and 0;8 (eight-twelfths) respectively.

In our familiar base ten counting we require ten symbols, and we count 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, ... In base twelve we need 2 additional digits — and these have been given the names and symbols, dek (*) for ten and el (#) for eleven. Thus we count 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, *, #, 10, 11, ... Arithmetic operations in this system may be performed in the usual manner, but one must remember to borrow or carry twelve not ten, when necessary.

In base twelve the numeral 4*6 symbolizes *4 gross dek dozen six.* Written in the more familiar decimal system it would be

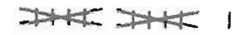
4×12^2	$+ * \times 12^1$	$+ 6 \times 12^0$	
4×144	$+ 10 \times 12$	$+ 6 \times 1$	
576	+ 120	+ 6	= 702

Weird? Not really — just unfamiliar.

To avoid confusion between the two systems a subscript is sometimes appended to a numeral to indicate its base. Thus we have $4{*}6_{twelve} = 702_{ten}$.

Incidentally, an abacus with 5 beads can serve nicely for dozenal arithmetic if you employ the other 2 beads as six units each. We can also use our usual tally

marks in base twelve by simply adding a second slash for every sixth item counted.



Tally Marks for Groupings of 6 Items

Another non-decimal system which has been rapidly gaining in a importance and usefulness is that based on the number 2, the binary system. The great German contemporary of Isaac Newton, Gottfried von Leibnitz, is credited with first suggesting the binary system which for a long time was considered an interesting but entirely useless system. It remained for the Hungarian–American mathematician, John Neumann, to point out that is was ideally suited for use in modern electronic computers. Only 2 digits, 0 and 1, are used which correspond to "switch off and switch on" positions in an electronic circuit. In this system we count: 0, 1, 10, 11, 100, 101, ... Since modern electronics makes electric switching exceedingly rapid, calculations based on the binary system are much faster than those based on any other system, beating by far even the experienced Japanese abacus operator mentioned earlier.

Fundamentally the binary system operates exactly like the decimal; only the base is changed. Let's consider, for example, the numeral 11010 in all 3 systems. In the decimal system:

$1(10^4)$	$+ 1(10^3)$	$+ 0(10^2)$	$+ 1(10^1)$	$+ 0(10^0)$
10000	+ 1000	+ 0	+ 10	+ 0 = 11010

In duodecimals:

$1(12^4)$	$+ 1(12^3)$	$+ 0(12^2)$	$+ 1(12^1)$	$+ 0(12^0)$
20736	+ 1728	+ 0	+ 12	+ 0 = 22476

And as a binary numeral:

$1(2^4)$	$+ 1(2^3)$	$+ 0(2^2)$	$+ 1(2^1)$	$+ 0(2^0)$	
18	+ 8	+ 0	+ 2	+ 0	= 26

Thus $11{,}010_{ten} = 22{,}476_{twelve} = 26_{two}$.

Arithmetic operations in this system are simplicity itself. The addition and multiplication tables are:

0 + 0 = 0	0 x 0 = 0
0 + 1 = 1	0 x 1 = 0
1 + 1 = 10	1 x 1 = 1

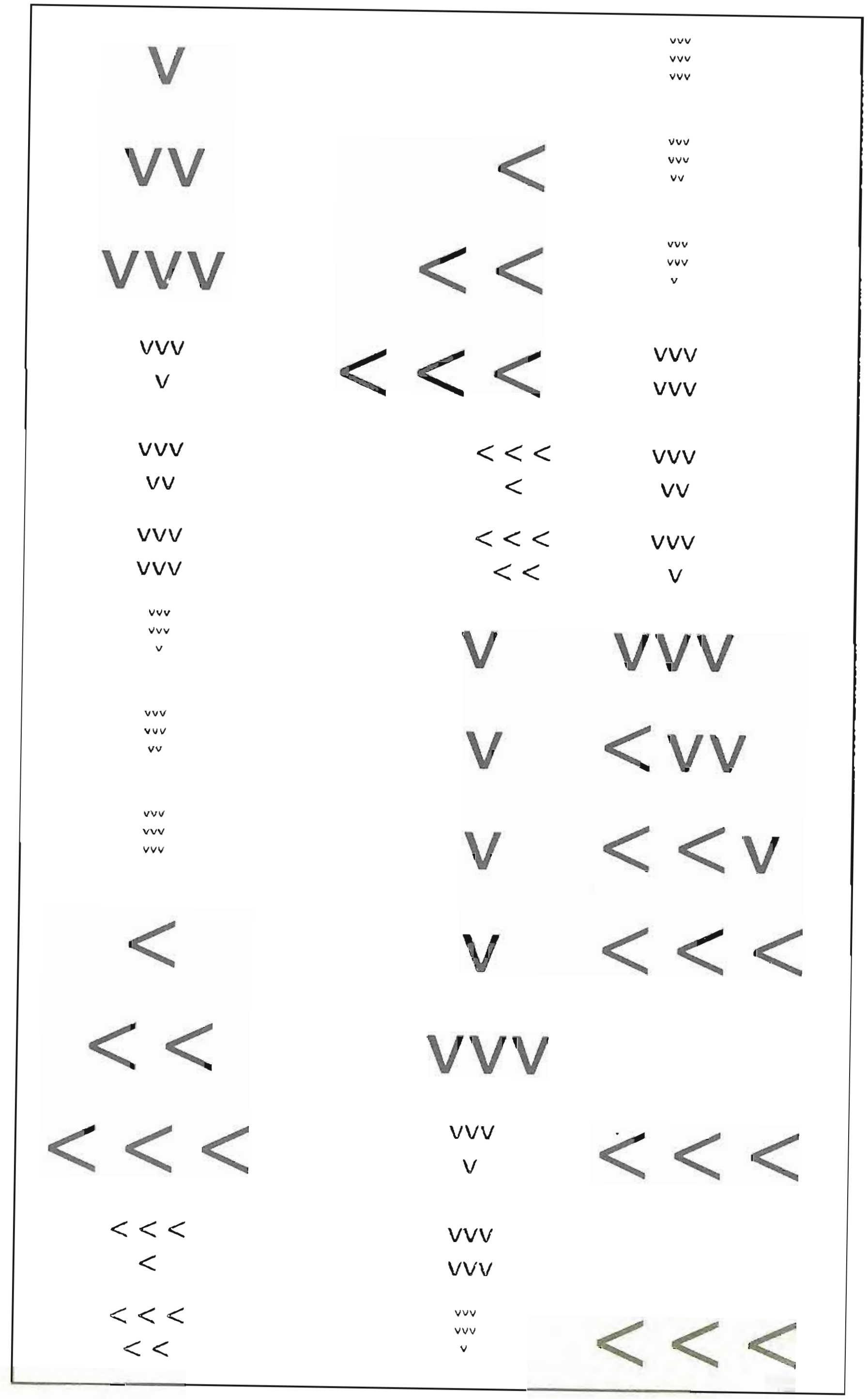
and that's all of them!

One can but wonder why such a simple system is not in general everyday use. Several reasons may be suggested. One is human inertia, or mental laziness, or the "if it ain't busted, don't fix it" attitude. A more valid reason is that writing binary numerals is often tedious and unwieldy, especially for large numbers. For example, 135 in base ten is 10000111 in binary and 457_{ten} is 111001001_2. To alleviate writing long strings of 1's and 0's, some calculators provide number systems based on eight (2^3) or on sixteen (2^4). The results of operations with these bases, when completed, are then converted to base two or base ten. Small hand calculators exist which will convert numbers back and forth between the bases 2, 8, 10 and 16. If you play around with the base 16, six additional digits must be added to 10 we are familiar with, and the first six letters of the alphabet are used for them: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, 10, ...It takes a bit of getting used to, I'll admit.

If you would like to practice with non—decimal numerals, may I suggest using the *pental* system based on five. For a start write out the numbers from 1 to 100_5 (i.e. to 25_{ten}) in this system, that is: 1, 2, 3, 4, 10, __, __, ..., 100.

Finally just for fun I thought you might like to try your skill with a bit of Babylonian arithmetic. I cannot vouch for the authenticity or accuracy of the transcription, but it does make sense.

On the following page is a copy of the markings on a Cuneiform tablet. Can you translate the groups of wedge-shaped symbols into familiar symbols and explain what the table is about? Hint: figure out what all the symbols in the left-hand column mean before working on the right-hand columns. (For the answer see page 16;(18.)



FROM THE COVER

The DSA enters more fully into the computer age with -

- e-mail: Several people have begun to request dozenal literature via our e-mail address: *genezirk@mindspring.com*

- A Web Page: Thanks to the efforts of our Secretary Christina Scalise and the generosity of Board Member Dr. John Impagliazzo we are in the process of establishing a web page tentatively titled *dozens.org*

ANSWER

to the question posed on page 14;(16.)

1		=	9
2	10 + 8	=	18
3	20 + 7	=	27
4	30 + 6	=	36
5	40 + 5	=	45
6	50 + 4	=	54
7	60 + 3	=	63
8	60 + 10 + 2	=	72
9	60 + 20 + 1	=	81
10	60 + 30	=	90
20	3(60)	=	180
30	4(60) + 30	=	270
40	6(60)	=	360
50	7(60) + 30	=	450

A table of multiples of 9 in base sixty.

JOTTINGS

- We welcome five new members:

  Jared W Haslett 361;
  Dr Russ Petersen 362; retired from the U of Arizona
  Herb Plafker 363;
  Dr Ted Labow 364;
  Zachary Borovicka 365; S, the grandson of Doris Demarest 303;

Russ sent us a correction on page 12; of WN 7* where

> *10, 10, 12* are incorrectly labeled *do, do-one, do-two*. It should, of course, read *10, 11, 12*.

Treasurer Alice Berridge spotted another lapse on page 2 where the re-elected *Class of 11*5;(1997)* should be *Class of 11*8;(2000)*.

- Thanks to the kind permission of Principal Sister Marcella, Gene Zirkel spoke about the advantages of dozenals to the 8th grade mathematics class at Transfiguration Parish Elementary school in Brooklyn. Is there someplace where you could be spreading the duodecimal gospel?

- On May 21st at the annual meeting of the Metropolitan Section of the Mathematical Association of America, President Jay Schiffman presented a paper entitled *Duodecimals and Other Cyclical Patterns of 3 Recursive Sequences in 4 Different Number Bases*.

- We are sorry to announce that Joan Firester has retired and no longer will lay out this *Bulletin* for printing. Joan has done an excellent job for many issues, and we pray that we can replace her with someone with her talent and patience. We wish both her and her husband all the best in the future.

Why not give some of our literature to a friend?
Brochures, *Excursions* and *Bulletins* are available.

CONSUMERS PREFER TRADITIONAL U.K. WEIGHTS AND MEASURES

Reprinted with permission from The Yardstick, *published by the* British Weights and Measures Association, *45 Montgomery Street, Edinburgh EH75JX, Great Britain.* http://users.aol.com/footrule

The evidence of independent market research is that, even after 30 years of official metrication, a **clear majority** of consumers **of all ages** think in UK weights and measures, and prefer to have them included on packaging and in recipes.

●Britons still have hearts for stones

●Most 'fail to get the measure of metric'

●***The Guardian:*** "A resounding 74% of the British people still prefer Imperial quantities" *Friday 2nd January 1998, p. 2*

●***The Sunday Telegraph:*** "Despite a 30-year campaign to force Britain to go metric, the majority of people still find it more convenient to use feet and inches, pints and pounds" *21st December 1997, p.13*

Main findings of the research

●THE OVERWHELMING MAJORITY OF THE BRITISH PUBLIC PREFER UK WEIGHTS AND MEASURES: 74% find feet and inches, pints and pounds, to be more convenient for most everyday purposes than their metric equivalents.

●THIS IS TRUE ACROSS ALL AGE GROUPS - including, perhaps surprisingly, the metric-educated 15-24s.

●WOMEN IN PARTICULAR are significantly more likely to prefer customary measures than men. 82% say they find the British system more convenient for most everyday purposes.

●SEVEN OUT OF TEN WANT 'DUAL MARKING' IN RECIPES AND ON PACKAGING: 70% of the British public would prefer the packaging for goods, and the ingredients listed in recipes to be given in both Imperial and metric measures, allowing the consumer to choose the system which suited him

or her the best.

●ONLY A TINY MINORITY FAVOUR METRIC-ONLY LABELLING: only 7% are in favour of the current move towards printing the packaging for goods, and the ingredients listed in recipes, solely in metric measurements. On the other hand, **THREE TIMES AS MANY WOULD PREFER IMPERIAL-ONLY LABELLING:** 21% would prefer recipes and packaging to be printed with UK measures only.

Details of the research: A survey of a nationally-representative sample of 1,000 British adults aged 15+, was commissioned by Abbott Mead Vickers●BBDO Ltd, Britain's leading advertising agency, carried out by the independent market research company RSL's *Capibus* division in November 1997 and presented to the Department of Trade and Industry, the European Commission and the British Weights and Measures Association in December 1997.

DSA MEMBERSHIP DRIVE

The mailing for the DSA membership year 11*6-11*7 (1998-1999) was made in early September of last year. All future membership drive mailings will be made at that time. To loyal members who paid their dues promptly we are extremely grateful.

DSA expenses mount: the cost of publishing The Bulletin amounts to more than $1200; and although other expenses amount to less than $90; membership dollars are critical. We especially depend upon the generosity of those members who make special contributions. Last year these extra contributions amounted to almost as much as regular dues. One anonymous member donated time to layout our most recent *Bulletin.* Not many of you have that special expertise but you can help in small ways. If you have not yet renewed your membership, kindly mail in your dues as soon as you can; please don't let your membership lapse. Some members send in dues for student relatives or friends. That's a wonderful way to insure the long term viability of our Society.

Every extra dollar allows us to do our job and spread the word about dozens.

Thanks for your generosity,
Alice Berridge, Treasurer

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. □

DETACH--HERE--OR--PHOTOCOPY

YOU ARE INVITED TO JOIN THE DOZENAL SOCIETY OF AMERICA

The only requirement is a constructive interest in duodecimals

Name ______________________________ __/__/__
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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)

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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