✧ Visit our *NEW* Website - See page 5 ✧

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

FOUNDED 1160;(1944.)

The Duodecimal Bulletin

THE DUODECIMAL BULLETIN

DOZENAL SOCIETY OF AMERICA

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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.

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THE DUODECIMAL BULLETIN

Whole Number Nine Dozen Two

Volume Four Dozen Seven

Number 1;

11#2;

FOUNDED 1160;(1944.)

IN THIS ISSUE

PRESIDENT'S MESSAGE

During the past two years, The Dozenal Society of America has commemorated its sixtieth anniversary. In 1160; (1944.), we were chartered as a Society while in 1161; (1945.), the first issue of The Bulletin went to press. In each of the past four issues, we have reprinted a classic article originally crafted by one of the pioneers of the society during its growing years. The excellent articles by Henry Churchman and J. Halcro Johnston serve as examples. Throughout the years, our message has been to consider the advantages of counting in groups of twelve rather than in groups of ten. Our articles and the new and improved website have served to convey this message. We always encourage contributions to our Bulletin. Indeed please submit articles and jottings and share your good ideas with our readers. Often the best pieces are brief ideas dealing with base twelve and number bases in general. Also consider joining the society and serving on one of our committees. Contributors are always welcomed.

Our Annual Meeting for 11#1;(2005.) took place on October 1st at Nassau Community College. On a personal note, I was both gratified and surprised to be the recipient of the prestigious Ralph H. Beard Memorial Award for 2005 and thank the Board of Directors of The Dozenal Society of America. It is a pleasure to be both your president and editor. During the past year, our Website has received a facelift. Many thanks to Daniel Romero, John Impagliazzo, and Christina D'Aiello for their hard work. Our aim is to offer a first class website and Bulletin. This will enable the public to better understand who we are as well as our mission. This is a continuous and ongoing project. With the continued support of our contributors and volunteers, I feel that we are achieving this goal. My best wishes for many more dozens of years.

Professor Jay L. Schiffman
President

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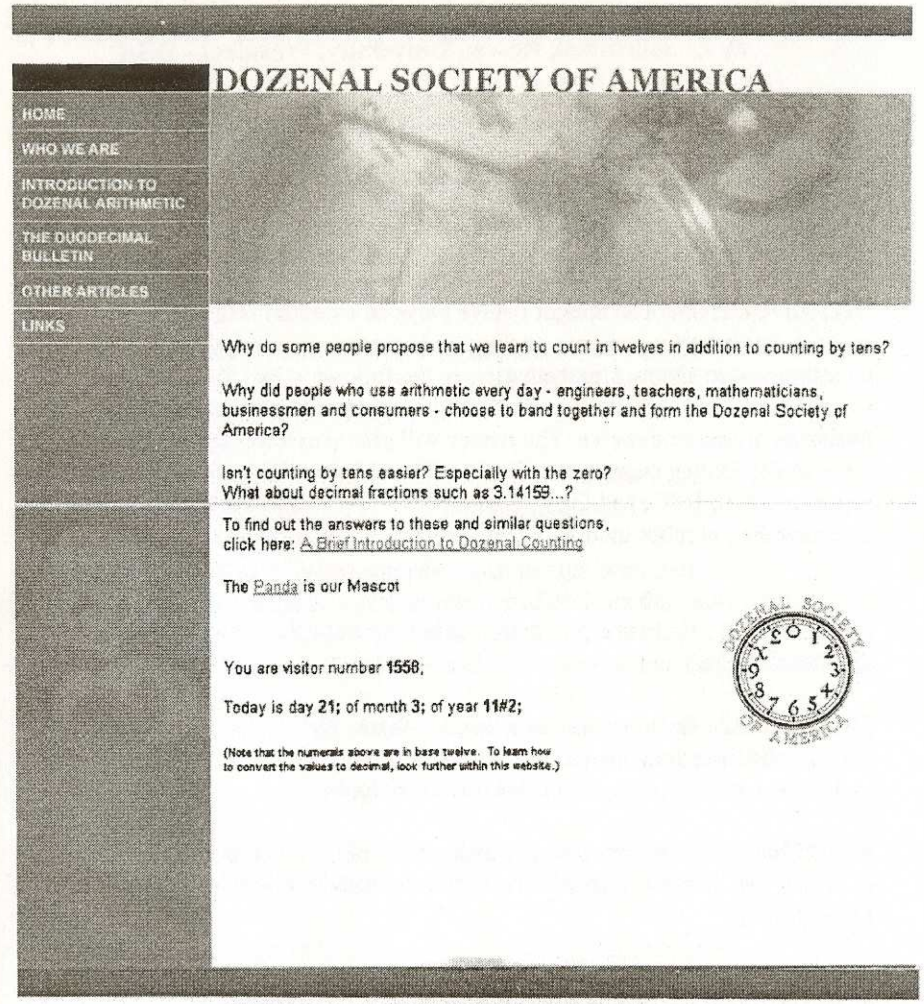
MESSAGE FROM THE BOARD CHAIR

Our president, Jay Schiffman, was hospitalized after a serious accident. He is home now and healing. We wish him a quick and total recovery and thank him for all that he has done for the DSA. He certainly deserved the award bestowed upon him. (See pp 1*; & 1#;).

We also thank all those who called or sent messages to him.

Gene Zirkel
Board Chair

NEW DSA WEBSITE



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provided that credit to the Dozenal Society of America is included.

After many months of work and with the cooperation of 3 professionals our new website is up and running.. You can log on at **www.Dozenal.org**. If you don't have a computer, it will be worth your time to go to your local library and take a peek.

A team effort by Christina D'Aiello, John Earnest, John Impagliazzo, Jay Schiffman and Gene Zirkel has produced a fine piece of work replacing our

[continued on page 11;]

THE MOST APPEALING INTEGER TWELVE

FIVE DOZEN INTRIGUING IDEAS WHERE DOZENS PLAY A ROLE

Jay L. Schiffman, Rowan University, President - DSA

Part I. (Part II will be published in our next issue.)

An address given at the Annual Meeting of the Dozenal Society of America, Babylon, New York, Oct. 2004
Commemorating Five Dozen Years 1160; - 11#0;(1944. - 2004.)

INTRODUCTION: The integer twelve plays an essential role in a great deal of work in mathematics and pure and applied science ranging in scope from measurement to abstract mathematics. In the following list, the reader will witness a number of dynamic results that are outcomes of twelve, multiples of twelve or divisors of twelve. The author will gladly extrapolate on any of these ideas in the list that require clarification. The abbreviations adjacent to the results are [M], [NT], [ALG], [GEN], and [GT] which respectively connote measurement, number theory, algebra, general knowledge, and graph theory.

PROPERTY 1: There are twelve inches in a foot and three feet in a yard (a divisor of twelve). [M]

PROPERTY 2: There are twelve eggs in a dozen, twelve dozen in a gross, and twelve gross in a great gross. [M] (In terms of eggs, the term crate has been used to denote a great gross by Professor James Malone.)

PROPERTY 3: Thirty-six inches equals one yard (a multiple of twelve) and five thousand two hundred eighty feet comprises a statute mile (likewise a multiple of twelve). [M]

PROPERTY 4: Unlike the awkward base ten, one can form a third, a quarter, and a sixth of a dozen. [M]

PROPERTY 5: All measurements of proper fractions having denominator sixty-four (such as 1/64. = 0;023 in base duo but 1/64 .= 0.015625 in base dek) require at most three digits in their duodecimal fractional expansions in contrast to as many as a half dozen digits in base ten to represent these identical fractions. It is essential in such fields as carpentry to measure within 1/64th of an inch in many circumstances. [M]

PROPERTY 6: There are twelve months in the calendar year and twelve hours on a standard clock. Twenty-four hour time is employed in military ventures. [M]

PROPERTY 7: There are twelve signs of the Zodiac, twelve tribes of Israel, and twelve apostles of Christ. [GEN]

PROPERTY 8: In trigonometry (Greek for triangle measure), sixty seconds equals one minute, sixty minutes equals one degree and three hundred sixty degrees equals one rotation. Observe that sixty and three hundred sixty are each multiples of twelve. [M]

PROPERTY 9: Twelve is the initial abundant number. (A number is abundant if the sum of all its proper divisors — including one but excluding the number itself — exceeds the number.) Observe that $1 + 2 + 3 + 4 + 6 = 14 > 10$. [NT]

PROPERTY X: Since every integer multiple of an abundant number is likewise abundant, every integer multiple of twelve is abundant. [NT]

PROPERTY #: Twelve is hypercomposite. (An integer is termed hypercomposite if it possesses a greater number of divisors than every integer that precedes it.) Observe that 10 has six divisors (1, 2, 3, 4, 6, and 10) while no integer less than 10 has more than four which is the case of the integer 8. [NT]

PROPERTY 10: Twelve is the initial integer containing a perfect number of divisors, 6. (An integer is styled perfect if it coincides with the sum of all its divisors including 1 but excluding itself.) [NT]

PROPERTY 11: Twelve is semiperfect. (An integer is classified as semiperfect if some subset of its proper divisors sums to it). Observe that $10 = 1 + 2 + 3 + 6 = 2 + 4 + 6$. [NT]

PROPERTY 12: Twelve is a Niven Number, in honor of the mathematician Ivan Niven. (A Niven Number is a number such that the sum of its digits is a divisor of the number.) Twelve is likewise divisible by the product of its digits. One readily notes that $1 + 2 = 3$ and $1 \times 2 = 2$. Each of the aforementioned integers is a divisor of twelve. [NT]

PROPERTY 13: Twelve is integer-perfect. (A number is classified as <u>integer-perfect</u> if one can make choices of + or - in front of all the divisors less than it and obtain the number.) Note that $10 = 1 - 2 + 3 + 4 + 6$. [NT]

PROPERTY 14: Goldbach's Conjecture (1742) communicated by Christian Goldbach to Leonhard Euler in 1742 asserts that every even integer > 2 seemingly can be represented as the sum of two primes. This conjecture remains unresolved to this day. Twelve is the largest known integer that can be represented uniquely as the sum of two primes (10 = 5 + 7). [NT]

PROPERTY 15: Twelve occurs as a factor of n! for each n ≥ 4. [NT]

PROPERTY 16: Two odd primes such as 3 and 5 that differ by two are called twin primes. While the number of positive primes is infinite, it remains an open problem as to whether this is the case for twin prime pairs. Apart from 3 and 5, the sum of every other pair of twin primes is divisible by twelve. [NT]

PROPERTY 17: The product of the first two components (the legs) in any Pythagorean triplet is a multiple of twelve and the product of all three components is a multiple of sixty. [NT]

PROPERTY 18: Twelve is the even component of the second Primitive Pythagorean Triplet (5,10,11). A Primitive Pythagorean Triplet is composed of three integers with each pair of integers relatively prime to one another and whose lengths form the sides of a right triangle. The initial dozen such outcomes where the even component is a multiple of a dozen are as follows:

1. (5,10,11)	2. (7,20,21)	3. (2#,10,31)	4. (#,50,51)
5. (11,70,71)	6. (47,40,61)	7. (65,30,71)	8. (55,60,81)
9. (15,100,101)	X. (77,50,91)	#. (71,#0,111)	10. (##,20,101) [NT]

PROPERTY 19: Twelve is the third element in the set of pentagonal numbers {1,5,10,1X, 2#,...} and the second element in the set of duodecagonal numbers {1,10,29,54,89,...}. One can show that the pentagonal numbers have the closed formula p(n) = n (3n + 1)/2. A closed formula for the duodecagonal numbers is given by p(n) = n(5n - 4). [NT]

PROPERTY 1X: Twelve is the product of the factorials of the first three counting integers and the first four whole numbers. (10 = 1! × 2! × 3! and 10 = 0! × 1! × 2! × 3!) [NT]

PROPERTY 1#: The Complete Graph, K_5, on five vertices has twelve distinct Hamiltonian Circuits. (A Hamiltonian Circuit in a graph is a closed walk in which each of the vertices is traversed once and only once returning to the starting vertex. A Complete Graph is one in which every vertex is joined to each of the other vertices save itself by means of an edge.) This is essential in the

Traveling Salesman Problem in which a salesman is required to cover each of the cities on his itinerary starting and ending at his home base. The goal is to cover each of these cities once and only once in the most efficient manner possible. [GT]

PROPERTY 20: If n ≥ 3, then K_n has (n - 1)!/2 distinct Hamiltonian Circuits and when n ≥ 5, this integer is a multiple of twelve. [GT]

PROPERTY 21: Twelve is the maximal number of edges possible for a connected graph to be planar. (A graph is classified as planar if it can be reconfigured in the plane in such a manner that edges intersect solely at vertices.) [GT]

PROPERTY 22: Ten dozen is the first even integer which is representable as the sum of two primes in twelve different ways; for
X0 = 7 + 95 = # + 91 = 11 + 8# = 15 + 87 = 17 + 85 = 1# + 81 = 27 + 75 = 31 + 6# = 35 + 67 = 3# + 61 = 45 + 57 = 4#+ 51. [NT]

PROPERTY 23: There are exactly thirteen dozen distinct isomorphism classes for undirected graphs of order six in the sense that each of these graphs is structurally different from all the others. [GT]

PROPERTY 24: Twelve represents the minimal number of divisors possessed by any nonabelian simple group. A simple group is a group having no proper invariant (normal) subgroups. The first such group consists of the group of all even permutations on five symbols known as the alternating group and is denoted A_5. This group has order sixty, a multiple of twelve. [ALG]

PROPERTY 25: Twelve is one of the possible integers serving as a factor of every nonabelian simple group. The others are 14 and 48. Decimally, one commonly refers to this important result as the 12-16-56 Theorem. [ALG]

PROPERTY 26: Twelve is the initial group order that fails to satisfy the direct converse to Lagrange's Theorem on finite groups. This key theorem asserts that the order of any subgroup of a finite group is necessarily a divisor of the order of the group. It can be shown that A_4, the alternating group of even permutations on four symbols has no subgroup of order six although 6 is a divisor of 10. Similarly no subgroup of order twelve exists for the matrix group of unimodular matrices (determinant one) matrices over the field of cardinality three, called The Special Linear Group SL(2,3) of order twenty-four. This group serves as the second smallest counterexample to the direct converse of Lagrange's Theorem. [ALG]

PROPERTY 27: Twelve is the first group order having more nonisomorphic nonabelian groups (3) (A_4,D_6, and Q_6) than abelian groups (2) (C_{12} and $C_2 \oplus C_2 \oplus C_3 \approx V_4 \oplus C_3$).

Here A_4 denotes the group of even permutations on four symbols, D_6 connotes the group of symmetries of the regular hexagon often called the dihedral group while Q_6 is the dicyclic group. represents The Four Group of Felix Klein known in German as Viergruppe and has the property that the square of each of its elements is the identity element in the group. C_2 and C_3 represent the cyclic groups of orders two and three respectively and are categorized by the fact that some element in the group serves as a generator of the group. The symbols $\oplus$ and $\approx$connote the direct sum of the abelian groups and isomorphism respectively. [ALG]

PROPERTY 28: Twelve is the initial non-square-free integer (an integer which is divisible by the square of some prime) possessing a group A_4 whose center consists solely of the identity. Such a group is termed centerless. The center of a group is the set of all elements that commute with every element of the group and is a normal subgroup of the original group. At the opposite end of the spectrum from centerless groups are abelian groups where $a \circ b = b \circ a\ \forall a,b \in G$. Thus the center of an abelian group is itself. [ALG]

PROPERTY 29: The automorphism group of a graph consists of those isomorphisms leaving the vertices fixed. The automorphism group of the complete graph on four vertices, K_4, is of order two dozen and is the full symmetric group on four symbols, S_4. One often refers to this group as the group of permutations on four symbols. [ALG]

PROPERTY 2X: Twelve serves as the largest cardinality for a subgroup of the first nonabelian simple group, As, of order sixty. This group has no subgroups of orders 13, 18, or 26. [ALG]

PROPERTY 2#: Twelve offers one the initial group order containing an example of a nonsupersolvable group, A_4. (A group is classified as supersolvable if it contains a descending sequence of subgroups each normal in the original group with cyclic factor groups.) [ALG]

PROPERTY 30: There are a total of two dozen nonisomorphic groups (abelian and nonabelian) of order twelve or less. (The order of a group is the number of elements it contains.) [ALG]

PROPERTY 31: There are precisely one dozen distinct isomorphism classes for nonabelian groups of order two dozen. [ALG]

PROPERTY 32: In the decimal base, the positive integer 27,720 represents the smallest integer which is divisible by each of the first dozen counting integers. (Observe that $27720 = 2^3 \times 3^2 \times 5 \times 7 \times 11$.) [NT]

PROPERTY 33: In the binary (base two) system of numeration, one finds precisely one dozen repunits of type 11111... that are prime in the range from one to three gross. These correspond to the following number of 1's: 2, 3, 5, 7, 11, 15, 17, 27, 51, 75, 8#, X7. For example, observe that $11111_2 = 2^4 + 2^3 + 2^2 + 2^1 + 2^0 = 14 + 8 + 4 + 2 + 1 = 27 = 31_{ten}$ which is prime. [NT]

PROPERTY 34: Consider the famous Fibonacci sequence, F_n, which is recursively defined as follows: Define $F_1 = F_2 = 1$ and $F_n = F_{n-2} + F_{n-1}$ for $n \geq 3$. In some applications, one requires $F_0 = 0$. Hence $F_3 = 2$, $F_4 = 3$, and $F_5 = 5$. The twelfth term in this sequence is one gross and represents the only perfect square in the entire sequence apart from the two initial ones. In 1963, a mathematician at the University of London furnished a proof to substantiate the above assertion. [NT]

PROPERTY 35: The period of the units digit for the Fibonacci sequence in base twelve is two dozen. The verification follows:. Let us write the initial two dozen terms of this sequence focusing on the units digit:
The terms are respectively 1, 1, 2, 3, 5, 8, 11, 19, 2X, 47, 75, 100, 175, 275, 42X, 6X3, #11, 15#4, 2505, 3X#9, 6402, X2##, 14701, 22X00. We see that the twenty-fourth term of the sequence ends in the digit 0 and the recursive nature of the sequence guarantees that the pattern recycles in the same fashion. One can similarly show that the length of the period of the units digit of the Fibonacci sequence in octals (base eight), decimals, and hexadecimals (base sixteen) is respectively one dozen, five dozen, and two dozen. [NT]

PROPERTY 36: Every twelfth term of the Fibonacci sequence is divisible by twelve. The above demonstration (see Property 35) furnishes a proof of this assertion since every twelfth term of the sequence terminates in the digit 0. In general, an integer in base b is divisible by b if the units digit is 0. [NT]

[Continued on page 2 Dozen]

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0.5 = 5/10. = ½ = 6/12. = 6/10; = 0;6

ASPIRANT'S TEST NUMBER 2

In the early days of our Society aspirants to membership were required to pass 4tests. This is the second test.

1; Add the following: 84X + 372 =
93#8 + 64X5 + #927 =

2; Add:

```
25,062      123,456     4,648
89,073      234,567     4,363
3#,X41      345,678     3,894
78,205      456,789     5,117
            567,89X     7,479
            678,9X#     1,532
                        2,721
                        6,28X

##X,832     #,X98,765
#X1,514     4,321,0#X
#XX,956     9,876,543
#XX,437     2,108,X98
##X,694     7,654,321
              #X9,876
            5,432,10#
```

3; Subtract:

```
#,874       43,8X1      #XX,XX9
X,732        9,742       ##,###

123,456          1,111,110
 78,9X#            987,654
```

4; When the motorman started his one-man trolley-car, there were 5 passengers aboard, 3 men and 2 women. One of the women was carrying her 8 months old son. At the first stop, 18 men and 7 women got on. At the second, 1 woman and 2 men got off, while 10 women and 2 men got on, and in addition their 2 sons, one 14 and the other 4 years old. At the next stop, 15 men and 11 women got off, including the woman with the baby. Next stop was the end of the line. (a) How many persons were then on the car? (b) How many males, how many female:? (c) How many persons rode altogether? (d) How many paid fares? (In this and the following problems, please give the process by which you reach your result.)

5; In the prairies states the roads run on section lines, an even mile apart. Mr. Tweet, a farm adviser, travels here and there, telling the farmers why they are not making any money. Starting from his headquarters at the county seat, he drove north 47 miles, then east 32, south 18, west 35, north 16, east 1#, south 46, west #, and quit for the night. (a) How many miles did he travel? (b) How far was he from his starting point when he quit?

6; Mr. Dybwad died, leaving a wife and 4 sons, Alfred, Benjamin, Charles and David. Under his will ½ of his estate went to his wife, excepting that out of her share she was to pay minor beneficiaries to the extent of 1/10 of the total estate. Al got ½ of his mother's entire half; Ben got half as much as Al; Charlie half as much as Ben; and Dave, poor guy, half as much as Charlie. The attorney got what was left. Dave's share was $9X6. (a) How much did each heir get? (b) How much did the minor beneficiaries get? (c) How much did the attorney get? (d) What was the value of the estate?

7; Papa wanted to give Willie a lesson in systematic saving, so, on the first of April he said, "Now, Willie, I am dropping a penny into this box. Tomorrow I shall drop 2, the next day 4, and so on, doubling the number each day through the month. By the end of the month there will be a nice little pile of pennies." Assuming that Papa kept his promise, (a) How many pennies would he drop on the last day of the month? (b) How many altogether would be in the box? (c) If it had been March? (d) February?

8; Take any number of 3 digits. Double it. Double again. Add 398. Divide by 4. Subtract the original number plus #5. How much is left?

Answers to this test are on page 1 dozen X.

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NEW DSA WEBSITE

continued from page 5

previous site which had served us well. We thank both those who volunteered to create the original - Christine, John Ernest and Gene along with Chris Harvey, and the current team for their hard work. We also thank the efforts of Tim Caruso, Paul Trapani and especially Dan Romero. It was Dan who finally brought the site to life.

DUES ARE DUE

Here is a suggestion from our former Treasurer Alice Berridge which will both reduce the work of our new Treasurer and at the same time save our Society money.

Since all of our members receive this Bulletin, instead of mailing out separate dues notices, we are appealing to you via this notice to please forward you dues for 11#2;(2006.) to

PROF ELLEN TUFANO, TREASURER
95 HOLST DRIVE WEST
HUNTINGTON NY 11743-3939

As in the past, we are very grateful to those who can afford to give more than our very low dues. Gifts to the DSA, a non profit educational corporation are tax deductible.

Dues are only one dozen dollars a year. Students pay only $3 a year. Please be both generous and prompt. Thanks. ✸

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GROUP HAILS 'MILES BETTER' SIGNS

[From the British Weights and Measures Association]

ANTI-METRIC CAMPAIGNERS ARE CELEBRATING AFTER A COUNCIL WAS FORCED TO MODIFY 30 OF ITS PUBLIC RIGHTS OF WAY SIGNS.

City of York Council erected the path markers with distances in kilometres (km) instead of miles, which is not authorised under highways regulations.

On Thursday, the authority said it had ordered plastic discs to fix over the offending metric distances.

The Active Resistance to Metrication, which takes direct action to change metric signs, welcomed the decision.

The authority is not replacing the signs but said the discs displaying the imperial distances would be put up over the next few weeks.

A spokeswoman said: "This was a genuine error and as soon as it was brought to our attention, we took measures to amend it.
QQ
"Giving information on a footpath sign such as the distance and destination is discretionary and we thought the public would appreciate this extra detail.

The imperial weights and measures of this country are part of our traditions and part of our culture
-Peter Rogers,
anti-metric campaigner

"The Ordnance Survey maps that we use to measure the footpaths are metric and the walk packs that we sell describe walks in kilometres so it made sense to the officer who ordered the signs to give corresponding information."

Active resistance Campaigners say any sign which incorporates metric distances is not a traffic sign within the meaning of section 64 of the Road Traffic Regulation Act 1984.

Protest group Active Resistance to Metrication (Arm) therefore believes people who alter road signs displaying metric distances can defend their actions under section 131 of the Highways Act 1980.

Peter Rogers, a supporter of the group, said: "Each time we are successful, it is a small but significant step towards eradicating them from our country.

"The imperial weights and measures of this country are part of our traditions and part of our culture.

"The attempts to impose metric signs is one by stealth and deception and has been going on for many years." ✸

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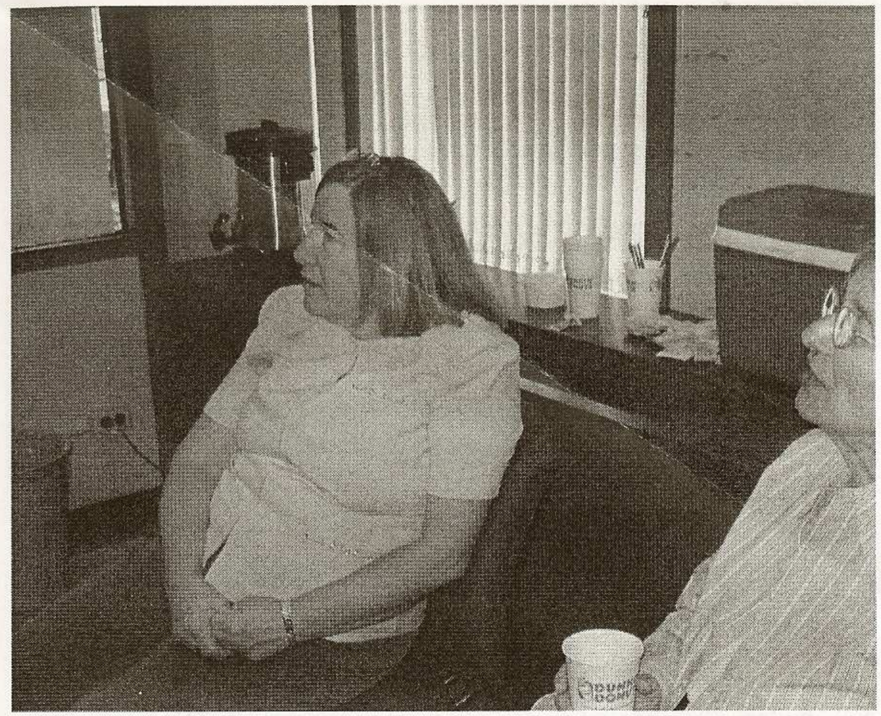
Mo-gro-do

In dozenals the numeral 24; is not read "twenty four". Rather, it is 'two-dozen four" or "two-do four". Similarly 346 is not read "three hundred forty six", but "three-gross four-dozen six" or "three-gro four-do six". In the same vein, 8#9X is read "eight-mo el-gro nine-do dek" and 1110 is "mo gro do". ✸



PICTURES FROM OUR RECENT MEETINGS

Above left: President **Jay** receiving the *Ralph Beard Award* from Board Chair **Gene**

Above right: New Treasurer **Ellen** (left) and former Treasurer **Alice**

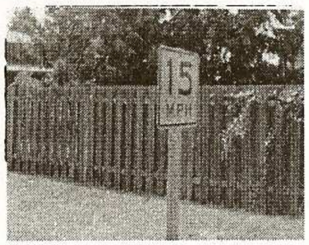
Below left: **Gene**, **Jay**, VP **John**, **Ellen** and **Alice**

KILOMETRE 'COCK-UP'

[From the British Weights and Measures Association]

A LEADING York councillor today labelled City of York Council's embarrassing mistake in putting up 30 wrong rights-of-way signs as the "kilometre cock-up".

Labour councillor Brian Watson warned council chiefs to be more careful in future after the signs were put up with distances in kilometres instead of miles.



"I always work in miles because of the speedometer on my car," Coun Watson said.

"I can't believe they got it wrong. They should take more care in future."

Anti-metric campaigners argue it is illegal to put up any highway signs with metric measurements, including those on public rights of way, under section 131 of the 1980 Highway Act.

Peter Rogers, a supporter of Active Resistance to Metrication (ARM), welcomed the council's decision to replace the signage. "Each time we are successful, it is a small but significant step towards eradicating them from our country," he said.

"The imperial weights and measures of this country are part of our traditions and part of our culture.

"The attempts to impose metric signs is one by stealth and deception and has been going on for many years."

Council chiefs admitted they got it wrong.

A spokeswoman said: "We can confirm that 30 new signs were erected with distances given in metric measures.

"This was a genuine error and, as soon as it was brought to our attention, we took measures to amend it.

"Giving information on a footpath sign such as the distance and destination is

[Continued on page 21;]

MINUTES OF OUR ANNUAL MEETINGS

DOZENAL SOCIETY ANNUAL MEETING
October 1; 11#1(2005.)
Nassau Community College
Garden City, NY 11530

Annual Board Meeting
Attendance: Gene Zirkel, Jay Schiffman, Ellen Tufano, John Earnest, Alice Berridge. (See photos pages 12; and 13;)

Board Chair Gene Zirkel called the meeting to order at 11:00 in Room B115 at the College. He officially welcomed the new Treasurer Ellen Tufano. The group had seen a demonstration of the about-to-be-launched DSA website. It will soon be available at *www.Dozens.org*. The group experimented with the Punter Calculator – Michael Punter's wonderful invention.

Minutes of the 2004 Board Meeting were approved.

The Nominating Committee slate for officers for the new year: Gene Zirkel- Board Chair, Jay Schiffman – President, John Earnest – Vice-President, Christina D'Ailleo – Secretary and Ellen Tufano – Treasurer was elected by the Board

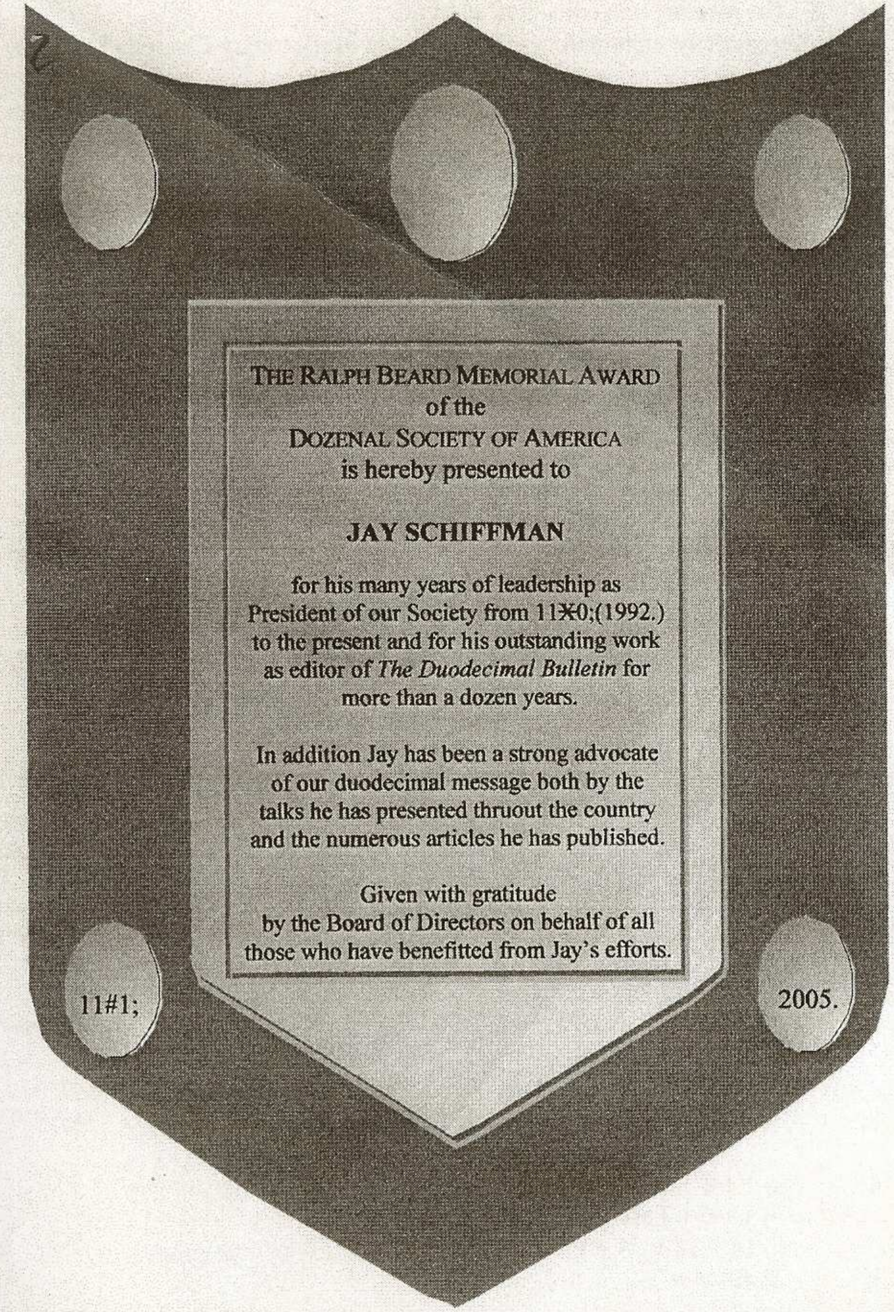
1. Gene and John had arranged this meeting and Gene had brought the coffee and doughnuts.
2. Because of the unexpected illness of the past Treasurer, Alice, the finances and status of funds was needful of immediate attention early in this year. It was decided at that time that the stocks that had been an inheritance from the Ralph Beard estate be rendered into Mutual Funds and this was accomplished after a great deal of trouble.
3. Gene reappointed Christina D'Aiello Parliamentarian to the Chair.
4. Gene turned over to Jay a backup ZIP file of a large bulk of DSA materials and files. On the advice of Vice President John Earnest he will use CDs in the future.
5. Editor's report – Jay reported that in celebration of our double anniversaries in each of the last four issues a classic article from a past *Bulletin* was reprinted. The current issue has Henry Churchman's article.

There was no other business; the date of the next meeting will be October 7, 2006 at Nassau Community College. The meeting was adjourned at 11:10 a.m.

Annual Membership Meeting

President Jay Schiffman presided.

6. Minutes of the 2004 Meeting were approved.
7. The Nominating Committee slate for the Class of 11#4;(2008.) – Paul Adams, Christina D'Aiello, Chris Harvey, Ellen Tufano and the slate was elected by the membership.
8. Jay reappointed Christina as Parliamentarian to the President.
9. Ellen Tufano presented the Treasurer's Report. It was noted that the Net Worth has increased by $2,000 since 2003. The report was approved by the membership.
10. Former treasurer Alice Berridge suggested some ways to lighten the burden of the Treasurer. After some discussion, it was agreed that, for this year, a dues solicitation letter be sent to members but in the future a special dues notice should be printed in our *Bulletin* instead.
11. A new Nominating Committee was elected consisting of Pat Zirkel, Jay Schiffman and John Earnest
12. Website report – Gene Zirkel said that John Impagliazzo had expedited contact with Oznic and Dreamhost to establish the new site. He said that there had been extensive proof reading by Jay, Christina and himself and that the project is very close to completion, it is hoped that eventually all past *Bulletin*s will be scanned onto the site. Fred Newhall had catalogued and indexed articles up until his death in 1993. It was therefore suggested that we not start with the first issue, but rather with the 1993 issue.
13. It was agreed that efforts will be made to cull the current membership list, in an effort to rid the rolls of disinterested parties. It was agreed to use a letter such as the one Gene has drafted and mail this to persons who might be part of that list.
14. Other Membership Business – It was pointed out that our dues are very cheap but nonetheless we decided to keep the current dues structure (eliminating Life Memberships) but striving to affect more contributions.
15. Rob McPherson has suggested that the statement on the upper part of page 2 of The Bulletin be changed to read "base twelve numerals in calculations, mathematics,,,"
16. The next meeting will be held at NCC on October 7. It is planned that we will visit the DSA Office and the NCC Library Dozenal Collection.
17. Special Presentation: The Charles Beard Memorial Award was presented to Jay Schiffman. Testimonials from Christina, John I., and Pat Zirkel were read in support of the presentation. The award reads:



18. The meeting was adjourned at 12:00.
Respectfully submitted by Alice Berridge for Secretary Christina D'Aiello.

After the conclusion of the Business meetings we enjoyed two excellent lectures:

Vice President John Earnest gave a PowerPoint display concerning the duodecimals that he had discovered in an 1852 text *Elementary Arithmetic* written by George R. Perkins and published by D. Appleton & Co. Members were impressed by this interesting excerpt from this old textbook.

President Jay used the Punter calculator to demonstrate Euclid and Euler's Theorems about the even perfect numbers. He developed a list of decimal even perfect numbers using the formula $P = 2^{p-1}(2^p - 1)$ where both p and $2^p - 1$ are prime.

Then, using the Punter Calculator which instantly converted the decimal numbers into dozenal numbers he showed that after the first two perfect numbers the dozenal numbers all end in 54; ✹

Finally, as we left John Earnest presented each of us with a CD containing a PowerPoint presentation of the photos taken during the meeting.

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ANSWERS TO TEST NUMBER 2

1; 1,000 23,608

2; 1XX,15# 1,#60,713 2#,378 4,#77,9X#
35,X35,168

3; 1,142 36,15# XXX,XXX 66,667 345,678

4; a) 1 + 6 + 8 + 1 = 14
b) 1 + 6 + 1 and 8 → 8 and 8
c) 14 + 17 + 10 + 1 = 40
d) 40 - 3 = 39

5. a)

N		E		S		W
47		32		18		35
16		13		46		3
61	+	51	+	62	+	44 = 198 miles

b) -44 / 9 -61 / 1

$\sqrt{(9^2 + 1^2)} = \sqrt{6X} \approx 9;1$ miles

6; Let V = Value of the total estate

W gets $\frac{1}{2}V - 4(\frac{1}{10})V$	= (;6 - ;4)V	= ;2V
A gets $\frac{1}{4}V + \frac{1}{10}V$	= (;3 + ;1)V	= ;4V
B gets $\frac{1}{8}V + \frac{1}{10}V$	= (;16 + ;1)V	= ;26V
C gets $\frac{1}{14}V + \frac{1}{10}V$	= (;09 + ;1)V	= ;19V
D gets $\frac{1}{28}V + \frac{1}{10}V$	= (;046 + ;1)V	= ;146V = $9X6
L gets $(1 - \frac{1}{2} - \frac{1}{4} - \frac{1}{8} - \frac{1}{14} - \frac{1}{28})V$		= ;046V

From D we obtain $\frac{1}{28}V + \frac{1}{10}V$ = $9X6
The LCM of 28 and 10 is 80.
Multiplying by 80 we obtain
3V + 8V = 9X6(80)
#V = 67,000
V = 67,000 / # = $7,222;22

Thus:

W gets ;2($7,222;22) =	$1244;44
A gets ;4($7,222;22) =	$2488.89
B gets ;26($7,222;22) =	$15#5;55
C gets ;19($7,222;22) =	$1070;9X
D gets ;146($7,222;22) =	$ 9X6;00
L gets ;046($7,222;22) =	$ 284;9X
	$7,222;22

7; a) 2^{24} = 75,X94,714
b) $2^{25} - 1$ = 12#,969,227
c) 2^{25} = 12#,969,228 and $2^{26} - 1$ = 25#,716,453
d) 2^{23} = 38,#48,368 and $2^{24} - 1$ = 75,X94,713

8; nothing, zero, 0

✹

ANOTHER SIX FINGERED ANIMAL

We have known that both the red panda and the giant panda have 6 fingers on each 'hand' (paw). That is why the panda is the chosen Mascot of the DSA

Now paleobiologists at the National Natural History Museum in Madrid have found another. An extinct relative and a forerunner of the red panda, *Simocyon batalleri,* was discovered recently with the same extra thumb. *S. batalleri* was approximately the size and shape of a puma. ✸

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THE MOST APPEALING INTEGER TWELVE

[Continued from page #]

PROPERTY 37: The length of the period of the last two digits of the Fibonacci Sequence in base duo is two dozen as one can conclude via the explanation in Property 35. One can demonstrate that the periods of the last two digits of the Fibonacci sequence in bases eight, ten, and sixteen are respectively eight dozen, two gross one dozen, and two gross eight dozen. The CAS (Computer Algebra System) MATHEMATICA (Wolfram Research Inc) enabled me to generate these solutions via the deployment of the INTEGER DIGITS command. [NT]

PROPERTY 38: The length of the period of the last three digits of the Fibonacci sequence in base ten is ten gross, five dozen, which is fifteen hundred decimally. [NT]

PROPERTY 39: The length of the period of the last three digits of the Fibonacci sequence in base duo is two gross. [NT]

PROPERTY 3X: The length of the period of the last four digits of the Fibonacci sequence in base ten is fifteen thousand (eight great gross, eight gross, two dozen.) [NT]

PROPERTY 3#: Consider the Fibonacci-like sequence known as the Lucas sequence L_n named after the nineteenth French mathematician Eduoard Lucas. The recursive definition follows:
$L_5 = 1$, $L_2 = 3$. Moreover, $L_n = L_{n-2} + L_{n-1}$ for $n \geq 3$. Hence $L_3 = 4$, $L_4 = 7$, and L_n = #. The initial two dozen terms of the Lucas squence duodecimally are 1, 3, 4,

7, #, 16, 25, 3#, 64, X3, 147, 22X, 375, 5X3, 958, 133#, 2097, 3416, 54#1, 8907, 121#8, 1 X#03, 310##, 50002. The next term is 81101. [NT]

PROPERTY 40: From the discussion in Property 3#, it is apparent that the sequence of units digits repeats in the cycle 1, 3, 4, 7, #, 6, 5, #, 4, 3, 7, X, 5, 3, 8, #, 7, 6, 1, 7, 8, 3, #, 2 ,... and then recycles. The units digit is never 0. It follows that no Lucas Number is divisible by twelve. Observing the sequence in bases octal and decimal, it is easily demonstrated that no member of the Lucas Sequence is divisible by the integers five, eight or ten. In contrast, one can show that among the first n^2 positive Fibonacci integers, at least one of them will be divisible by n. [NT]

PROPERTY 41: The length of the period of the Lucas sequence in base duo is two dozen. For a discussion, see Property 40. [NT]

PROPERTY 42: The length of the period of the units digit of the Lucas sequence in bases eight, ten, and sixteen, is respectively one dozen, two dozen, and one dozen. (Examine the units digit in each of the respective bases to justify these contentions.) [NT]

PROPERTY 43: The length of the period of the last two digits of the Lucas sequence in base duo is two dozen. The argument discussed in Property 3# confirms this. [NT]

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KILOMETRE 'COCK-UP'

[Continued from page 1 Dozen 6]

discretionary and we thought the public would appreciate this extra detail.

"The Ordnance Survey maps that we use to measure the footpaths are metric and the walk packs that we sell describe walks in kilometres, so it made sense to the officer who ordered the signs to give corresponding information."

The council said it would not replace all the signs, but has ordered plastic discs displaying the imperial distances and these would be placed over the metric numbers over the next few weeks at a cost of £229. ✸

MAILBAG

Dear Editor,

I am fascinated by Michael Punter's wonderful little calculator found in Bulletin number 8X; Vol 45; No 1; pp 6 to X. It is terrific.

It got me to thinking about the number bases and conversions involved. For example, a simple problem such as 17; x 7; involves 6 base conversions and 3 different bases.

1 & 2.	Convert dozenals17; and 7; to decimals 19. and 7;
3 & 4.	Convert decimals 19. and 7. to binary 10,011 and 111
	Multiply 10,011 x 111 obtaining 10,000,101
5.	Convert binary 10,000,101 to decimal 133.
6.	Convert decimal 133. to dozenal #1;

I wonder how many users are aware of what is going on in the background of even a simple multiplication.

Keep up the good work,
Jean Kelly

***

And two from a friend "across the Pond"-

Dear Editor,

I guess I should stop 'lurking' and come back into contact.

I joined the DSGB a - er, well, a dozen years ago now, and got briefly involved with the BWMA, but fell back into the shadows.

I'm not really a mathematician or a dozenal - I'm a conservative and a lover of complexity. I hate the parade of dull tens that decimalisation and ISO metrication represents.

And ultimately, perhaps, my biggest complaint about metrication is its lack of 'poetry'. I wonder - is that strange?

Best wishes
Andrew Denny

***

Incidentally, I'm blogging daily on www.grannybuttons.com and have an enmity against what I call 'the tyranny of the ten'. I'm not sure I'm a dozenal - I mean that in the sense that I'm a traditionalist, not simply a counter of 12s - but I am certainly on the same side against the tedious Decimalists.

I think someone should set up a blog to espouse our common views. I told this to Shaun Ferguson and he wasn't very receptive, I'm afraid. If any of you want guidance and help on blogs, I'm happy to oblige.

Last week on my canal boat I was delighted to see that the Birmingham City Council have started to put traditional stickers - yards and fractions of a mile! - over the execrable decimetric 'heritage signs' on Birmingham's canals, so that's a start. This is BIG news. As I see it, the loss of fractions is as big an issue as the march of decimetric. (I prefer the term 'decimetric' over 'metric' because to me 'metrication' simply means 'measurment'.

Best wishes
Andrew Denny

***

Dear Editor,

Keep up the good work.

My basic quibble with base ten is in doing time calculations. It would be so much more convenient to calculate in base twelve! And if we're going to do time in base twelve, why not do everything else that way? We already have a basis there especially in linear measurement.

My only quibble with Dozenal ideas is the symbolism. I think using Arabic numbers with an X and E tacked on the end (or an A or B) leads to some mind-bending confusion especially in 'fractionals'. Also if a dozenal system ever did become viable it would be nice to be able to instantly differentiate it from Arabic numbers. (Would using zodiac symbols work for this? I think it would definitely be a stretch for people to learn to associate zodiac symbols [or some other twelve symbols] with numbers, but people who are interested in changing our whole number system aren't allergic to 'stretching.')

Also something that is rarely/never mentioned by advocates of a dozenal system is that every note of music we hear is formed from a base twelve division of tones (except perhaps for some primitive aboriginal music). Also, playing cards could be construed as a 'Freudian' desire for a base twelve system depending on the game played. I am working on 'beta' version of a playing card game that emphasizes the base twelve connection.

Burt

***

Our Reply
Your comments re symbols are interesting. Basically, there are two schools of thoughts re dozenal symbols.

Some people, such as yourself, advocate twelve *new symbols*. this way, it is argued, you immediately know whether you have a decimal numeral or a dozenal numeral. This is one of the reasons we advocate using a period in decimals and a semicolon with dozenals whenever the context is not clear. Thus 7 + 3 = 10. and 7 + 5 = 10; while 0;6 = 0.5 = ½

The disadvantage, of course, is that you must learn a whole new set of symbols. This is not easy for a newcomer.

There have been many others who have suggested new symbols in the past. These usually have some innate method of knowing which numeral a given symbol represents.

On the other hand, there are those who think that for starters - and *to win people over* to our cause - we should keep the current ten numerals and add two new symbols such as Ӿ and #. This is the official position of our Society at this time.

When dozenals become accepted, I am sure that new symbols will also arise *at that time.*

A big drawback for the zodiac symbols is that they are *not found on typewriters* nor on *Computer key boards.*

♈	♉	♊	♋	♌	♍	♎	♏	♐	♑	♒	✋
0	1	2	3	4	5	6	7	8	9	Ӿ	#

Another big disadvantage is that most cannot be written cursively *with one or two strokes*. This is a draw back for many of the proposals sent to us. Our current decimal numerals require 2 strokes for 4 and (usually) 5. The other eight numerals only need 1 stroke.

X and E take 2 strokes each while script E needs only 1. Ӿ with a strike out needs 3 and # needs 4.

Ideally symbols would need *only one* (or at most two) *stroke*(s) and one would easily recognize their value. I noticed that a few zodiac symbols have this property, for example:

Gemini ` (two) looks like the Roman Numeral II.
Pisces i (el or eleven) resembles our current # but with only 1 horizontal stroke.

Cancer a (three) seems to be made up of a 6 and a 9, and obviously 9 - 6 = 3.
An alternate symbol I have seen for **Capricorn** looks like VS, and we certainly are vs. stopping at 9 instead of counting on to el.

Incidentally, we have published several articles on music over the years.

I don't see you point re playing cards. There are a dozen and one cards in each suit. I would be interested in seeing your card game.

-Editor

***

The card game goes like this.

Throw out the 10's to make a 48-card deck. The order is Ace low, 2, 3, 4, 5, 6, 7, 8, 9, J, Q, K. Ace is only high if a King has been played.

The players meld pairs out of their hand that equal a dozen, e.g. 3 & 9, J & 2, Q & A. A 'King' can be melded as a Dozen by itself. Pairs can be from the same suit for 2 points or from the same color for 1 point.

Once players have melded, they pick up their cards and play tricks with the 2 of clubs starting play. If a player plays a card that makes a dozen with a previously played card they take that pair out of the trick and place it in front of them. If they make a pair that is a red/black Dozen then the player who laid down the first card takes the Dozen and that is a negative point.

At the end of the tricks the cards won are picked up and the players can pick out new Dozens from their pile to add to the pairs they collected during play.

We've also tried playing this with bidding and trump, etc.

Take care,
Burt Smith

***

Thanks for directing me to the new web page and the calculator.

Seems like anyone with 6/10 ths of a brain would like base dozen, but in talking to my colleagues they seem to think I come from beyond Neptune.

Clay Macdonald

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 ____________________ /__/__

Last First Middle Date

Mailing Address (including full 9 digit ZIP code)

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Annual Dues .... Twelve Dollars (US)

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(A limited number of free memberships are available to students)

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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:

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