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

ISSN 0046-0826

THE DUODECIMAL BULLETIN

58;

```
      SUBROUTINE DOZ(CHARR, INT)
      INTEGER INT, X, COUNT, K, M, INTARR(6)
      CHARACTER CHARR(6), DOZSTR*12, DOZARR(12)
      EQUIVALENCE (DOZSTR, DOZARR)
C
C     SET ARRAY CHARR TO BLANKS & SET ARRAY INT
      DO 1 K = 1, 6
          CHARR(K) = ' '
          INTARR(K)  = 0
    1 CONTINUE
C
C     INITIALIZE DOZSTR (AND THEREFORE DOZARR A
      DOZSTR = '0123456789*#'
```

TWO SUBROUTINES -- Page 14;

Volume 30;
Number 3;
Fall 1987
1197;

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).

The Duodecimal Bulletin is an official publication of the DOZENAL SOCIETY OF AMERICA, Inc., c/o Math Department, Nassau Community College, Garden City, LI, NY 11530.

BOARD OF DIRECTORS OF THE DOZENAL SOCIETY OF AMERICA

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. Years ago, as you can see from our seal, we used Ӽ and Ɛ. Both * and Ӽ are pronounced "dek". The symbols # and Ɛ are pronounced "el".

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 ½ = 0.5 = 0;6.

THE DUODECIMAL BULLETIN

Whole Number Five Dozen Eight

Volume 30; Number 3;

Fall 1197;

FOUNDED 1944

IN THIS ISSUE

Patricia McCormick Zirkel, *Editor*
Editorial Office:
6 Brancatelli Court
West Islip, New York 11795

DOZENAL SOCIETY OF AMERICA

SCHEDULE OF THE ANNUAL MEETING -- 1197;

Friday to Sunday
October 16 to 18, 1987
(October 14; to 16; 1197;)

Nassau Community College
Garden City, LI, NY 11530

Schedule

Friday Evening, October 16, 1987

A social evening with friends and spouses. Tentative plans call for a theatre party, followed by a gathering for refreshments at the home of one of the members. Please call for details.

Saturday, October 17, 1987

I BOARD OF DIRECTORS MEETING -- Tentative Agenda

10 A.M. (Administrative Tower -- Nassau Community College, Garden City, LI, NY)

1. Call to order - John Impagliazzo, Chair

2. Report of the Nominating Committee, and proposal of a slate of Officers.

   A. Catania, Chair
   A. Berridge
   D. George

Continued...

---

3. Election of Officers. (Officers are formally installed later, at the evening Banquet. Thus the business of the Annual Meeting is conducted by outgoing Officers, and all Committee reports are given by outgoing Chairs.)

4. Remarks of the Chair

5. Appointments to Various Committees. (For current Committee appointments, and Chairs, see Bulletin number 56; pages 5 and 6.)

   Annual Meeting
   Finance
   Awards
   Constitution and By-laws
   Video
   Parliamentarian
   Editor
   Reviewers for the Bulletin

6. Further affairs of the Board

7. Adjournment

II ANNUAL MEMBERSHIP MEETING -- Tentative Agenda

1. Call to order - Gene Zirkel, President

   Attendance

2. Minutes of the 1986 Annual Meeting - F. Newhall

3. President's Report - G. Zirkel

4. Treasurer's Report - J. Malone

5. Reports of other Officers, as called for.

Continued...

SCHEDULE, 1987 ANNUAL MEETING, Continued

Reports of Committees

7. Annual Meeting - Catania, Berridge, Razziano, Smith

8. Finance - Scordato, George, Malone, Razziano, P. Zirkel

9. Constitution and By-laws - G. Zirkel, Berridge, Scordato

   It is proposed to revise the Society's Constitution in order to bring it up to date with current Society practice and to make its language non-sexist. This announcement will serve as a formal notice, in line with Article IX of the Constitution.

10. Awards - Scordato, Berkmann, P. Zirkel

11. Reports of other Committees, as called for.

Gene Zirkel receives the Annual Award from Dr. John Impagliazzo at the 1986 DSA Annual Meeting.

SCHEDULE, 1987 ANNUAL MEETING, Continued

---

12. Nominating - Catania, Berridge, George

    a) Nomination and Election to the Board of the Class of 1990.

    b) Selection of Nominating Committee for 1987 - 1988.

13. New business.

III LUNCHEON

IV AFTERNOON PRESENTATIONS

Speakers and topics to be announced. Last year's slate of speakers covered such topics as: the evolution of number systems; a new method of constructing digits; magic squares; and factoring.

Continued...

Fred Newhall spoke on the evolution of number systems during last year's afternoon presentations.

SCHEDULE, 1987 ANNUAL MEETING, Continued

V EVENING BANQUET

Once again, members, spouses, guests and friends will gather for cocktails and dinner on the top floor of the Nassau Community College Administrative Tower. The cost per person has been in the area of $20 to $25 per person. At the banquet, the incoming Society Officers are installed.

VI Sunday, October 18, 1987

Sightseeing and departure, at leisure.

Please let us know if you plan to attend, so that arrangements can be made for refreshments, tickets, etc. Those who call from out of town will be directed to local hotels.

For further information, or to advise us of your plans, you may call (516) 669 - 0273.

CONSTITUTION CHANGE PASSES

The mail-in vote taken on August 1st (see Bulletin number 57; pages 12 and 13;) passed almost unanimously. Only one negative vote was cast. Hence, from now on, officers of the Society may be selected from any of the voting membership, and are not restricted to only Members of the Board of Directors. Our thanks to all who took the trouble to mail their ballots in.

-Gene Zirkel,
President

AN ACCURACY SCALE

Fred Newhall
Smithtown, LI, NY

The following is the text of a speech presented at the Dozenal Society Annual Meeting of 1985.

Consider an ordinary old-fashioned twelve inch ruler, properly called a scale. This one even has the words "Do to Others As You Would Have Them Do to You" - the Golden Rule- printed on it. It's been with us ever since some king used his foot as a standard unit of length and had the foresight to divide it into twelve inches. It is illustrated below:

0	1	2	3	4	5	6	7	8	9	10	11	12
Do to Others As You Would Have Them Do to You												

We in the Dozenal Society would like to change the 10, 11, and 12 to read *, #, and 10 (pronounced dek, el and do respectively).

So we now have a Dozenal Scale:

0	1	2	3	4	5	6	7	8	9	*	#	10
Dozenal Scale												

When measuring distance, we use three of these for a yard, 16 and a half for a rod, and 5280 for a mile. Astronomers run distance into Astronomical units and into light-years. Our universe has no bounds. We say that measurements increase without end. For this reason I have made a jagged end to the high end of the scale below. Similarly we can go below one, to mils (thousandths of an inch) or to microns

Continued...

(millionths) and approach zero, but even with an electron microscope we still see measurable particles and never get to zero, so I'll break off the lower end of the scale, leaving a jagged edge also:

```
  1   2   3   4   5   6   7   8   9   *   #   10
                    Do-decade
```

This was a Decade, but now it is more properly called a Do-decade. In order to make the next higher Do-decade, the 1 on the lower end would be named 10 (do), and the 10 on the higher end would be renamed 100 (gro). The next higher would be 100 to 1000; then 1K (kilo) to 10K; then 100K to 1M (meg); Then 1M to 10M; etc. In the other direction, we could create the next lower decade by letting the 1 become 0;1 and the 10 at the other end becomes a 1 to make the Do-decade from 0;1 to 1. Below that the next Do-decade is 0;01 to 0;1. Then 0;001 to 0;01. Etc. So we now have continuous measurements in Do-decade steps above and below our standard Do-decade foot.

The decade idea is at least four dozen years old in electronics. But the electronics industry adds another concept. They formerly made resisters of each value from 1 to ten ohms (or 10 to 100, 100 to 1K, etc.). But they found that the values above 5 were not selling as much as those close to 1. This is because the low numbers are more accurate. So the Radio Manufacturers Association (RMA) established "20% Numbers":

1 + 20% = 1.2
1.2 + 20% = 1.5 (approximately)
1.5 + 20% = 1.8
Etc. as you can see below:

```
                      ACCURACY SCALE
1         2    3    4    5    6    7    8    9    *    #    10;0
1.2 1.5  1.8  3.3  3.9  4.7  5.6  6.8  8.2       10.0
```

Continued...

You will observe that each value on the above scale is 20% apart, and the 1 starts at 1 inch while the ten is at * inches.

If you made the mistake of going into an electronics store and asking for a 500 ohm resistor, they'd laugh at you. They only sell 470 or 560 ohm values. For 50 years our industry has used these standard RMA values on resistors, capacitors, inductors, etc. They represent steps of approximately the twelfth root of ten, since there are twelve steps from 1 to twelve (another dozenal triumph!).

There are also 10% RMA values in between these values. But these values are not useful for measuring distance since they stop at *, dek.

Now you can see a new set of standard values, eleven of them, corresponding to the eleven steps from 1 to twelve, that stretch the full length of our scale:

```
1        2         3       4     5     6     7     8    9    *    #    10
1;3 1;6      2;5  3;1  3;9  4;9   6;1      7;6       9;6             10
```

These are in steps of the eleventh root of twelve (# steps up to do). Or in steps of about 0;30 (25%).

Now we can renumber our ruler to produce an "Accuracy Scale" such as this:

```
1      2     3     4     5     6     7     8     9     *     #     10
1 2 3 4   5   6     7     8       9          *          #         10
```

Whatever part of the ruler we use for measuring, our readings will always have the same accuracy: about 0;30 (or 25%). Of course you can be more accurate by adding a mark between these marks for about 0;16 (or 12.5%) accuracy.

Continued...

AN ACCURACY SCALE, Continued

These in-between marks would not be mid-way between 1 and 10;. If we divide each step into twelve parts and use dozenal points -- for instance 1, 1;6, 2, 2;6, 3, etc. -- we would have a scale twelve times as accurate.

Everything we measure assumes a certain degree of accuracy. Take a simple thing like counting sheep. If a farmer owns only a dozen sheep, he wants to account for every one. But a rancher with several great gross of sheep could care less if one or two were missing. (A few may be born or die before he could count them all anyway.) In each case, they are measuring with an accuracy of ±20% or less.

You may not realize that we've been using Accuracy Scales for many years. In a hardware store you can buy an eight-penny nail. The sizes of nails start with small steps: one-penny, one-and-a-half-penny, two-penny, and with increasing sizes between ten-, twelve-, and sixteen-penny sizes. Screws and nuts also come in increasing sizes: numbers 2, 3, 4, 5, and 6 are close together, with steps of increasing sizes up to numbers eight, ten, twelve and fourteen. Electric wires are in gages, with the high numbers being thinner and close together: 28, 24, 22, 20 gage. Your lamp cord is 18 gage. The wire in the wall is 14 gage, and the 6 gage wire leading into your house is about 1/4 inch. Steel and plastic sheets come in gage thicknesses which are also in accuracy steps. Drill bits come in many even steps, but the hardware store has small demand for sizes like 7/8" or 15/16". The numbered drill bits are accuracy sizes.

There's no reason why accuracy should not apply to time. One hour is more carefully measured than twelve hours. Imagine a clock of the future with 8 hours on the right side of the face and the remaining 4 hours on the left side! How about a thermometer with ever increasing degrees, or a speedometer with large spaces around 55mph? And why should a bank dealing with thousands of dollars a day have to spend hours at the end of the day trying to balance out an error of a few cents?

So, some day the ordinary old wooden ruler may become obsolete, but not, of course, the Golden Rule!

DOZENAL NUDE NUMBERS

Jean Kelly
New York, NY

Definition

A nude number is defined as one which exhibits some of its factors. In particular a number is nude if and only if every digit of the number is a factor of the number.

Thus 13 in base twelve is a nude number since both 1 and 3 are factors of 13, but 15 is not a nude number since 5 is not a factor of 15.

Clearly no number containing a zero is a nude number. Thus twelve is not a nude number in duodecimals, although it is in base dek.

There is an infinity of nude numbers since 1, 11, 111, . . . are all nude numbers, as are any numbers composed of repeating digits such as 222, 33, and 5555555. Furthermore these numerals represent nude numbers in any base whatever.

Continued . . .

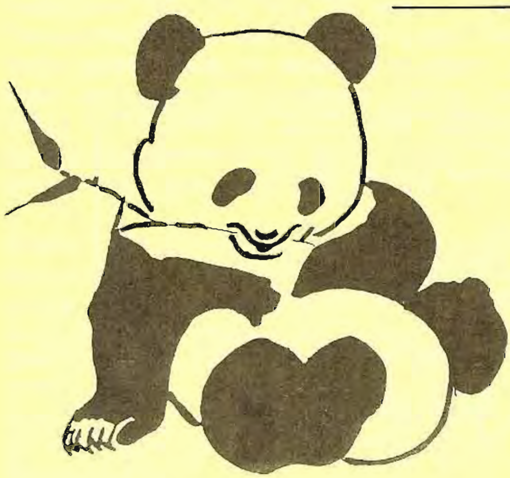
The Degree of a Nude Number

Dozenal 214 is a nude number since it is divisible by 2, 1, and 4. It is also divisible by 14 and by 214. We say that the degree of nudity is therefore equal to 5. The degree of nudity is defined to be the total number of such factors.

For a 2 digit number, AB, the maximum degree of nudity would be 3. This would be the case if AB was divisible by the three numbers, A, B, and AB. Dozenal 28 is a 2 digit nude number of maximum degree

For a 3 digit number, ABC, the maximum degree of nudity would be 6. This would be the case if ABC was divisible by A, B, C, AB, BC, and ABC. Question: Can you find a three digit nude number of the sixth degree?

Continued...



BROCHURES AVAILABLE!

Thanks to Alice Berridge, Margo and Tony Razziano, and Barbran Smith, our new DSA brochure is now available.

Why not bring grosses to your next meeting? Interest dozens in the DSA's message...

...or even a few. Ask for some today.

Large Nude Numbers

In base dek the largest number of distinct digits that a nude number may have is 7. [See 1 below]

What is the largest number of distinct digits a nude number may have in base twelve? It would seem that in this case factorability of the base is a detriment rather than an asset, since zero can never be a digit in a nude number, and so if 6 is a digit of a nude number then 2, 4, 8, and * cannot also be digits. Hence 6 is probably not a digit of the largest nude number with distinct digits. Furthermore if 3 or 9 are digits of a nude number then 4 and 8 are not digits, and vice-versa.

Thus the possible digits are 1, 2, 5, 7, *, #, and either 3 & 9 or else 4 & 8. If all 8 of these digits were to be used, the sum of the digits would be 4 dozen, which is not divisible by #. This implies that the original number is not divisible by # either. Hence the nude number with the largest number of digits contains 7 or fewer digits. Question: Can you find such a number?

Consecutive Nude Numbers

111, 112, 113, and 114 are four consecutive duodecimal nude numbers. It can be shown that consecutive nude numbers must consist of all 1's except for the last digit. In base dek you cannot find more than 3 consecutive nude numbers. Here is a case where the factorability of the base improves the result. The dozenal numbers from 1,111,111,111,111 to 1,111,111,111,117 are 7 consecutive nude numbers in base twelve. Question: Is this the largest number of consecutive numbers, or can you find 8 consecutive dozenal nude numbers?

For more information on nude numbers see:

1. "Nude Numbers, by Roberto A. Ribas in the <u>Pentagon</u>, vol 46(1), Fall 1985, pp 18-31.

2. Letter to the editor by Yoshinao Katagiri in <u>The Journal of Recreational Mathematics</u>, vol 15(4), 1982-1983.

TWO SUBROUTINES FOR BASE CONVERSION

A SUBROUTINE TO CONVERT FROM BASE TWELVE TO BASE TEN

Brian Doherty,
Student,
Nassau Community College
Garden City, LI, NY

What follows is a subroutine written in the WATFIV version of FORTRAN. It accepts NUMBER, a string of up to three characters representing a base twelve number and returns the integer, TENS, the base ten equivalent of NUMBER.

The statement

```
EQUIVALENCE (NUM, DIGIT), (NUMSTR, NUMARR)
```

overlays the six characters in the single string, NUM, with the six single characters in the array, DIGIT, and it overlays the twelve characters in the single string, NUMSTR, with the twelve single characters in the array, NUMARR.

```
      SUBROUTINE TWELTO(NUMBER, TENS)
      INTEGER TENS, TWELAR(6), K
      CHARACTER NUMBER*6, NUM*6, DIGIT(6)
      CHARACTER NUMSTR*12, NUMARR(12)
      EQUIVALENCE (NUM, DIGIT), (NUMSTR, NUMARR)
C
      NUM = NUMBER
      NUMSTR = '0123456789*#'
C
C     IF ARRAY IS NOT FILLED THEN SHIFT CHARACTERS TO THE
C     RIGHT AND PAD ZEROS ON THE LEFT
      WHILE(DIGIT(6) .EQ. ' ')DO
          DO 1 K = 1, 5
              DIGIT(7-K) = DIGIT(6-K)
    1     CONTINUE
          DIGIT(1) = '0'
      END WHILE
```

Continued...

```
C     CONVERT CHARACTERS IN ARRAY NUMARR INTO INTEGERS IN
C     ARRAY TWELAR
      DO 2 K = 1, 6
          COUNT = 1
          WHILE(DIGIT(K) .NE. NUMARR(COUNT))DO
              COUNT = COUNT + 1
          END WHILE
          TWELAR(K) = COUNT - 1
    2 CONTINUE
C
C     ADD THE INTEGERS IN TWELAR MULTIPLIED BY THE
      APPROPRIATE POWERS OF TWELVE
      TENS = 0
      DO 3 K = 1, 6
          TENS = TENS + TWELAR(K) * 12 ** (6 - K)
    3 CONTINUE
      RETURN
      END
```

A call of this procedure such as

```
      NUMBER = '2#'
      CALL TELWTO(NUMBER, TENS)
```

will store three characters in NUMBER, padding a blank on the right - '2# '. The subroutine will store this string in NUM (and hence also in DIGIT). It then removes any blanks on the right, replacing them with zeros on the left, storing

```
| '0' | '2' | '#' |
```

in DIGIT.

These characters are then converted to integers and stored in TWELAR AS

```
| 0 | 2 | 11 | .
```

Continued...

They are then added:

$$0 * 12^2 + 2 * 12^1 + 11 * 12^0 = 35$$

and 35 is stored in TENS

The calling program may now proceed to use the contents of TENS in many ways. A simple output could be accomplished by the statements

```
      WRITE(6,100) NUMBER, TENS
100   FORMAT(1X, A6, '; = ', I7, '.')
```

which for this example would yield

```
      2*; =      35.
```

A SUBROUTINE TO CONVERT FROM BASE TEN TO BASE TWELVE

Regina DeBonis,
Student,
Nassau Community College
Garden City, LI, NY

What follows is a subroutine written in the WATFIV version of FORTRAN. It accepts INT, a base ten integer and returns CHARR, a character array containing the base twelve equivalent of INT.

The statement

```
      EQUIVALENCE (DOZSTR, DOZARR)
```

overlays the twelve characters in the single string, DOZSTR, with the twelve single characters in the array, DOZARR.

Continued...

The MOD function is used to obtain the successive remainders when dividing the number X by twelve.

```
      SUBROUTINE DOZ(CHARR, INT)
      INTEGER INT, X, COUNT, K, M, INTARR(6)
      CHARACTER CHARR(6), DOZSTR*12, DOZARR(12)
      EQUIVALENCE (DOZSTR, DOZARR)
C
C     SET ARRAY CHARR TO BLANKS & SET ARRAY INTARR TO ZEROS
      DO 1 K = 1, 6
          CHARR(K) = ' '
          INTARR(K)  = 0
    1 CONTINUE
C
C     INITIALIZE DOZSTR (AND THEREFORE DOZARR ALSO)
      DOZSTR = '0123456789*#'
C
C     FIND SUCCESSIVE REMAINDERS AND STORE THEM IN THE
C     ARRAY, INTARR
      COUNT = 1
      X = INT
      WHILE (X .NE. 0) DO
          INTARR(COUNT) = MOD(X, 12)
          COUNT = COUNT + 1
          X = X / 12
      END WHILE
      IF(COUNT .GT. 1) COUNT = COUNT - 1
C     THE VARIABLE COUNT NOW CONTAINS THE NUMBER OF DIGITS
C     IN THE BASE TWELVE RESULT
C
C     CONVERT INTEGERS IN THE ARRAY, INTARR, INTO CHARACTERS

C     & STORE THEM IN CHARR
      M = 6
      DO 2 K = 1, COUNT
          CHARR(M) = DOZARR(INTARR(K) + 1)
          M = M - 1
2     CONTINUE
      RETURN
      END
```

Continued...

SUBROUTINES, Continued

A call of this procedure such as

```
      INT = 412
      CALL DOZ(DOZSTR, INT)
```

will repeatedly divide by 12 as follows

```
12)412
   )34   with a remainder of  4
    )2   with a remainder of 10
     0   with a remainder of  2
```

These remainders are stored in INTARR which now contains

| 4 | 10 | 2 | 0 | 0 | 0 | .

These integers are then converted to characters and stored in reverse order in CHARR as

| 'Ƀ' | 'Ƀ' | 'Ƀ' | '2' | '*' | '4' | ,

where Ƀ indicates a blank.

The calling program may now proceed to use the contents of CHARR in many ways. A simple output could be accomplished by the statements

```
      WRITE(6,100) INT, (CHARR(K), K = 1, 6)
100   FORMAT(1X, I7, '. = ', 6A1, ';')
```

which for this example would yield

```
    412. =    2*4;
```

Editor's note: we welcome computer programs in any language which change numbers from one base to another, which do arithmetic in dozenals, etc.

DOZENAL JOTTINGS

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

PAUL RAPOPORT of McMaster University in Hamilton, Ontario, Canada, sent us a copy of a recent letter to **DON HAMMOND** of the DSGB in which he makes some comments on a dozenal clock which he is in the process of developing. In answer to **IGOR VALEVSKY'S** comment (in the DSGB Journal) that there is nothing wrong with hourly divisions as we have them now, he answers: "Why have 2 dozen anythings in the day when 1 dozen provides a complete dozenal metric approach for time?" Much of what is disliked in digital clocks "is in fact due to the combination of three number bases in the current counting of time. [Ed: i.e. ten, twelve, and sixty.] In my system (which I was far from the first to suggest), the day consists of 1000;units, and a dozenal digital clock with four digits enables one to observe time passing every 4 1/6 seconds." Paul is pleased that the DSA has ordered such a clock, since ongoing problems have slowed delivery. However, he says that the prototypes run perfectly, and expects to be able to supply our clock shortly...

We also heard recently from **NELSON GRAY** (seemingly of Everywhere, USA), who travels extensively, having logged over 215,000 miles back and forth across the U.S. by recreational vehicle! He says that he will keep trying to work on a stop-over with the DSA during a future trip. We look forward to it...

For a dozenal thrill, read Dean Koontz' Strangers, a recently published novel (great read!). The dozenal reference is near the end, and to say more will destroy your enjoyment of the plot. Let us know when you find the reference...

Continued...

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

DOZENAL JOTTINGS, Continued

The September 1987 issue of the Mathematics Teacher published a correction to a problem appearing in their May issue. (See also "Impossible" in our Bulletin number 57; page 6.) As part of the correction, they printed the DSA's offer to them to send a free copy of the Bulletin to any of their readers who would like to know more about number bases...

Continued . . .

DEK AND EL

Before we learned that the symbol # was called an octothorpe, it was difficult to write or to speak about the telephone company's symbols, * and #. In a 1971 letter to Skip Scifres, former Editor Henry Churchman suggested that we call them snowflAke and Bell. This gave credit to Ma Bell and also was in alignment with the hexadecimalist's use of A and B.

However, when we speak about numerals and not about symbols, things are different. Whether we call them asterisk and octothorpe, or snowflAke and Bell; whether we use

* and # (DSA)
X and Ɛ (Dwiggins)
ᘔ and Ɛ (DSGB)
d and k (Humphrey)
A and B (hexadecimalists)
T and E, etc.,

no matter what symbols we write, it seems that most of us still tend to pronounce them as dek and el.

DOZENAL JOTTINGS, Continued

GENE AND PAT ZIRKEL recently travelled to Seattle, WA, where they visited with **DUDLEY AND KAY GEORGE** on Vashon Island, just outside Seattle. The photo of Dudley (left) and Gene was taken at a beautiful spot on their island. (Mount Ranier was actually visible in the background, although the photo did not pick it up.) The Georges and the Zirkels had a fine time together, although dozenal subjects were not much discussed!...

The Society recently learned of the death of Father Joachim Watrin, O.S.B., formerly of St. John's Abbey in Collegeville, Minnesota. Father Watrin was a valued dozenalist who will be missed...

In looking back through the list of recent new members, we noticed that many are from the NY metropolitan area. We hope that they will take advantage of their proximity to our upcoming Annual Meeting and give us a chance to meet them...

...end...

"I think that building large computers should be done with the fewest people possible. One is perfect, but you can't quite do it with one. So the next best thing is about 12."

Seymour Cray
Builder of the Cray Supercomputers

CINDERELLA DEK-EL-DO

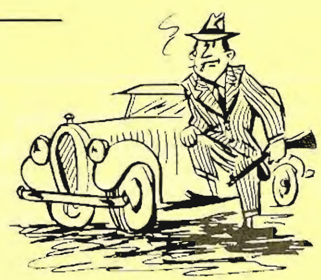
Henry C. Churchman

Where does Cinderella go,
  Everytime the clock strikes Do?
Count the chimes in groups of three,
  Listen to the One-Two-Three;
Four-Five Six; oh, what a fix,
  For someone near is timing;
Seven-Eight-Nine; will she be mine?
  Then Dek-El-Do is chiming.
But---

Where does Cinderella go,
  Every time the clock strikes Do?
What the heck when it strikes Dek,
  That is nothing round her neck;
Still the belle, let it strike El,
  While dancing through the music;
As you know, then midnight Do,
  Finds Cinderella homesick.
But---

Where does Cinderella go,
  Everytime the clock strikes Do?
Listen and I'll tell you now,
  Tell you why, exactly how
When the clock strikes midnight Do,
  Cinderella has to go
To another dancing spot,
  Food, Champagne, and music hot.

You can't afford to miss the DSA Annual Meeting -- October 16 and 17, 1987. BE THERE!



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 accomodated 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, and as early as 1585, Simon Stevin stated that the duodecimal base was to be preferred to the base ten.

The parallel seems tenable. The notation of the dozen base better accomodates 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