COUNTING IN DOZENS

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

Our common number system is decimal - based on ten. 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.

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	3Ɛ2	Two ft. eight in.	2;8'
19Ɛ	1000	Eleven ft. seven in.	Ɛ;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 *2Ɛ*, 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 X, and the successive remainders are the desired decimal number.

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

Numerical Progression

1	One		
10	Do	;1	Edo
100	Gro	;01	Egro
1,000	Mo	;001	Emo
10,000	Do-mo	;000,1	Edo-mo
100,000	Gro-mo	;000,01	Egro-mo
1,000,000	Bi-mo	;000,001	Ebi-mo
1,000,000,000	Tri-mo	and so on.	

Multiplication Table

1	2	3	4	5	6	7	8	9	X	Ɛ
2	4	6	8	X	10	12	14	16	18	1X
3	6	9	10	13	16	19	20	23	26	29
4	8	10	14	18	20	24	28	30	34	38
5	X	13	18	21	26	2Ɛ	34	39	42	47
6	10	16	20	26	30	36	40	46	50	56
7	12	19	24	2Ɛ	36	41	48	53	5X	65
8	14	20	28	34	40	48	54	60	68	74
9	16	23	30	39	46	53	60	69	76	83
X	18	26	34	42	50	5X	68	76	84	92
Ɛ	1X	29	38	47	56	65	74	83	92	X1

The Duodecimal Bulletin

Whole Number 2X

Volume 15, No. 1
September 1961 (1175)

THE DUODECIMAL SOCIETY OF AMERICA

20 Carlton Place ~ ~ ~ ~ ~ Staten Island 4, N. Y.

THE DUODECIMAL SOCIETY OF AMERICA

is a voluntary nonprofit organization 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.

Full membership with voting privileges requires the passing of elementary tests in the performance of twelve-base arithmetic. The lessons and examinations are free to those whose entrance applications are accepted. Remittance of $6, covering initiation fee ($3) and one year's dues ($3), must accompany applications.

The Duodecimal Bulletin is the official publication of the Duodecimal Society of America, Inc., 20 Carlton Place, Staten Island 4, New York. F. Emerson Andrews, Chairman of the Board of Directors. Charles S. Bagley, President. Ralph H. Beard, Editor.

Separate subscriptions $2.00 a year, 50¢ a copy.

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THE ANNUAL MEETING

The Roof Terrace of the Carnegie International Center was again the stage for the Annual Meeting on Thursday, 20 April 1961, at 8:30 P.M.

President Camp called the modest assembly to order and asked Secretary Beard to report on the year's activities. Our more positive action as to the payment of dues has reduced our membership somewhat in the past two years; the present figures are 56 members, 10 student-members, (total members 66), and 12 aspirants, 4 student-aspirants, (total aspirants, 16), for a membership total of 82. Previously, our total had reached 110, and we have had 10 enrollments since then - but no one of the present membership owes more than a year's dues.

However, we maintain our contact with those whose continued duodecimal activity indicates their live interest. A more serious factor is that we have had only 8 new enrollments each in 1959 and 1960, whereas in some years there have been 14. We know of no cause for this decrease, but pay special attention to each new inquirer in the effort to overcome it.

There has been increased demand for our literature, and a satisfying amount of this has involved cash sales. There has been a smaller demand for the Manual of the Dozen System than we had hoped, but this, too, is increasing.

There have been two issues of the Duodecimal Bulletin for 1960. We would like to increase the frequency of issue, but hesitate because of variations in the flow of articles and papers for it. We close some issues with a good bit of material carried over, and then find trouble in getting enough for the next. We take great pleasure in the quality of the papers we do receive, and seek to stimulate the production of more of them. We average about 25 paid subscriptions to the Bulletin, and there are a few cash sales of each issue. The growth in the sales of our literature seems to indicate that we should pay special attention to the further development of this field of revenue.

The year has been marked by the official studies made in England, in Australia, and in America about the desirability of adoption of the metric system, and what the costs and time elements of such change might be. The general tenor of the findings seems to be that no change is to be contemplated in the immediate future, though we learn that the U.S. Army plans to adopt metric dimensions for its general weapons, because of the importance of interchangeability and international unity in the equipment for the common defense of the free world. India is arranging to change to a decimal currency system, and Australia seems to favor a similar move. The public notices of these discussions has elicited letters-to-the-editor by our members and brought a slightly increased demand for our literature.

The event of the greatest importance to the Society has been the meeting of the First International Dozenal Conference at the Normandie estate, La Herpiniere, of M. Jean Essig, in France last September. A general report of the discussions of that conference was published in the recent issue of the Duodecimal Bulletin, and now they have been carefully reviewed by our Board.

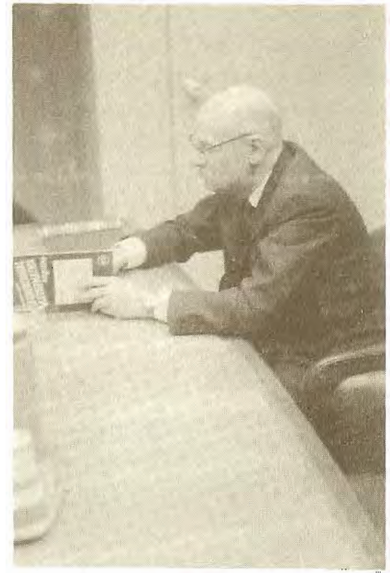
The Duodecimal Society of Great Britain, as a result of these discussions, has adopted the symbols ↊ and ↋ in place of our 𝒳 and ℰ, and the terms "ten, eleven, dozen, gross, and meg," in place our dek, el, do, gro and mo.

The Conference devoted serious consideration to the measure of length for the basis of the duodecimal metric system. Much favor was accorded the proposals of M. Essig, Mr. Churchman, and Mr. Bagley which are in fair agreement on a unit of 44 inches, (*38* inches), derived from the duodecimal subdivision of a circumference of the earth. For this reason, it suggested collaboration between these three, to bring their proposals into conformity.

The Conference took initial action toward the formation of l'Association Duodecimale Internationale, suggesting that invitations be extended to M. Charles Volet, President of the International Bureau of Weights and Measures at Sevres, France, to serve as Honorary President, and to Sig. Eduardo Buda of Rome, and Mr. Ralph Beard to serve as Honorary Vice-Presidents; and elected an Executive Committee with M. Jean-Marie Essig, President, Mr. Kingsland Camp, Vice-President, and Mr. Brian R. Bishop, Secretary and Treasurer. The Association will federate national societies and individuals where no national society exists, and serve to stimulate and coordinate world-wide duodecimal action on an organized basis. (The decisions of our Board of Directors on these matters will be found in Mr. Andrews report of the Board's actions in a later part of this reviews.)

Our application for affiliation with the American Association for the Advancement of Science has been disapproved on the grounds that our Society's research is dedicated to the advancement of only one system. Since the same criticism has not been an obstacle to the affiliation of the Metric Association, it would appear that the basic factor of the rejection is that we have not yet acquired sufficient weight. And this should therefore be our primary objective.

Treasurer Humphrey reported that the major item of the budget this year was the printing of an edition of 5000 copies of the Manual of the Dozen System, costing about $1400. Since this is a sales item, largely, it may be regarded as an investment rather than an expense. Further, the receipt of a final payment of about $3000 in final settlement of the Seelbach Estate is a capital item rather than income.



Treasurer H. K. Humphrey

Aside from these factors, the financial picture for the year shows receipts of $1150 against expenses of $2550. The deficit of $1400 is unusually enlarged by the printing of new stationery, - by another reprint of An Excursion in Numbers, (the 8th), - and by the printing of an Esperanto version of the Society's folder.

We close the year 1960 with financial assets of about $7000. But, clearly, an incursion of the extent of $1400 emphasizes that we need to be concerned about bringing our receipts into closer agreement with our expenses.

Our greatest asset is the magnificent support of our donors, whose selfless devotion alone makes our operations possible, and keeps the Society in good health. In the Society's sixteen years, their donations have exceeded $27,000. We are deeply grateful to them.

Mr. Humphrey's formal audited report was received with an earnest expression of our warm thanks for his fine work.

President Camp reported that the Annual Award for 1959 had been presented to Brian R. Bishop at the close of the l'Herpiniere Conference, with a French translation of the citation for the benefit of the others present.

The report of the Nominating Committee was presented by Wm. C. Schumacher, Chairman (whose son also was present). It recommended the re-election of the Directors of the Class of 1961 as the Class of 1964, and accepted the suggestion of the Secretary that the Nominating

Committee continue to serve for another year. The Directors involved are Kingsland Camp, Tom B. Linton, and H. C. Robert, Jr. The vacancy in this Class occasioned by the death of Lewis Carl Seelbach continues, and no replacement is suggested now. These recommendations being approved, the elections were formally effected.

Chairman Andrews reported on the actions of the Board of Directors. Their session had been preceded by the usual series of informal meetings and luncheons which so well facilitate the deliberate canvass of opinions and clarifications of our problems. The Board met at 2:00 P.M. today in a conference room in this building. Chairman Andrews presided, and those present were Directors Bagley, Beard, Camp and Humphrey.

Chairman F. Emerson Andrews

Mr. Andrews said that, aside from the foregoing reports, a large part of the Board's considerations concerned the actions of the First International Conference. This is a major step toward world-wide organization for the promotion of duodecimals. And the preferences expressed merit serious thought. Among them are the following:

a) Adoption of a unit of length based on the duodecimal subdivision of the earth's circumference, the 10^{-7} part yielding a unit of *44* inches (*38* inches), or *3;8* feet. It is suggested that this unit be divided into *4* new feet, the new feet and inches to be ;ℰ of the present units.

b) The circle to be divided duodecimally. This accords with our present preference, the first subdivision being the familiar angle of 30°.

c) The 24-hour day to be divided duodecimally into duors, (or biheures). Mr. Camp recommended that the clock dial, which necessarily must show noon and midnight at two opposite locations, show noon (*6*-duors), at the top of the dial, and midnight, (*0*-duors), at the bottom.

d) None of the conferees liked our 𝒳 and ℰ as symbols for dek and el, (ten and eleven), though no agreement was reached as to their equivalents. Units of mass, of electricity, and of currency were discussed, without agreement.

These proposals were given the most serious considerations by the Board. The Duodecimal Society of America has not officially adopted, nor endorsed, any symbols nor standards of measure. It has permitted the usage of 𝒳 and ℰ and of a duodecimal system of standards involving the inch, foot, and yard, the pint and the pound, as aids in education of the public in duodecimals, and in enlisting general interest.

Mr. Andrews reported that the Board has decided that no change in usages nor standards will be endorsed at present for the Duodecimal Society of America. The Board welcomes the formation of the Association Duodecimale Internationale, and has approved a modest subvention toward the initial expenses of the Association, without commitment as to continuing obligation.

The Board has elected Charles S. Bagley, 1314 Ohio Ave., Alamogordo, New Mexico, as President of the Society. Mr. Bagley is a geodesist of the Air Force Missile Development Center, at Holloman Air Force Base. He has been active in church and community affairs in Alamogordo, and has been a prominent member of the American Rocket Society from its early days. The other officers of the Society have consented to continue in their present assignments. In closing, Mr. Andrews expressed the enjoyment shared by the Directors and their ladies in the Directors Dinner at the Beekman Towers Hotel.

President Charles S. Bagley

Mr. Camp then turned the Chair over to our new President, Mr. Bagley, who in a brief talk about the Society's objectives, said that scientific progress has emphasized the need for a comprehensive metric system, as only the duodecimal system can offer. It is essential that the Society foster a


Secretary Ralph H. Beard

scientific study of duodecimals that would attract the interest and support of the large scientific organizations.

Mr. Beard took the floor to express the thanks of the Society to Mr. Camp for his long and devoted service as President. He has held that office for six years, the longest term in the history of the Society. It has been an important period for us, a period of transition. We no longer question whether duodecimals can elicit sufficient support to justify the continuance of our work; - but now our problem is to devise plans and projects that will best put to work the fine support that we have, and will cultivate most wisely the growing interest that the public has shown.

The formal work of the meeting having been completed, President Bagley announced its adjournment for the refreshments, and the active exchange of ideas and comment we so much enjoy.

A DUODECIMAL ABACUS

by Robert W. Edelen, Department of Mathematics,
Western State College, Gunnison, Colorado

The abacus is no doubt one of the oldest computing devices used by man. That it is still in use today in many countries (mostly in the eastern hemisphere), speaks well for its efficiency, low cost and simplicity. A few years ago a Japanese woman using an abacus beat an American with a Monroe calculator. The abacus requires much more operator skill than our mechanical adding machines and computers, but its low price and portability make it a very desirable computing aid. One can develop enough skill to surpass ones speed and accuracy in paper and pencil computation with an abacus in very short time. This is especially true when working in a new base such as our duodecimal system.

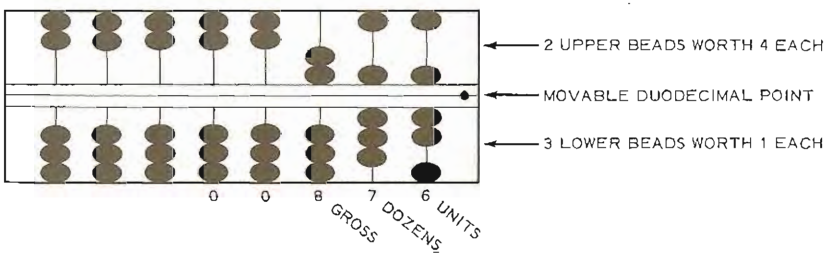
The abacus is and has been constructed in many forms. In general, the variations are in the number and value of beads in each column. There is a tendency to use too many beads by most and also to be able to register more than the base minus one in each column. The Chinese abacus will hold 3 times 5 in each column and has two upper beads worth 5 each and 5 lower beads worth one each. They only use one of the beads worth 5 in general. The Japanese abacus has eliminated this extra bead and can hold 2 times 5 in each column. Actually, each column should hold only the base minus one. By computations that this writer will supply on request, it was found that the minimum number of beads needed for a duodecimal abacus is 5. One has a choice of 2 upper beads worth 4 each and 3 lower beads worth one each --- or 3 upper beads worth 3 each and 2 lower beads worth one each. Both systems allow a total of the base minus one as the maximum held in a column. Of the two choices, the preference by this writer is the former. Actually, the two systems are about equal in all criteria. The choice is one of ease of manipulation and inherent speed.

The duodecimal abacus is most easily made by modifying a Chinese abacus. Let us be thankful that they retained the two upper beads. We proceed as follows:

1. Remove 2 lower beads (out of the 5 beads), or tie, or in some other manner deactivate, 2 lower beads in each column. (If the beads are removed, use something as a spacer so that the free space in each row is a little larger than one bead.)
2. Space the upper 2 beads so that a space equal to one bead is left for movement, as in step one.

3. (Optional) Paint the 2 upper beads yellow to identify their value of 4. The unit beads (lower) can be painted brown for a value of one.

Let us now proceed to learn to add on the duodecimal abacus.



The drawing shows an abacus with the number 876 set in. A bead is counted only if it is pulled next to the center bar. The far right column is usually reserved for units. Larger groups are found to the left as shown. If the number has a fractional part, then some columns can be reserved at the right of the units place for it. Sometimes a sliding decimal point is installed on an abacus to aid in working problems of this type. As with many computers it is easer to set in numbers from right to left, i.e., first set in the units, then dozens, then gross, etc. There are three cases encountered in adding a digit to a column which contains an amount other than zero. They are:

Case 1. - There is room in the column for the digit to be added *and* the bead values not used allow this to be done directly by moving beads toward the center bar.

Case 2. - There is room for the digit in the column *but* the bead values will not allow a direct set in as in case one. There are only 6 digits that offer this problem. They are listed below with the method of setting them in.

To set in
(add to column) ****add**** and subtract in same column.

1	one upper bead	3 lower beads
2	one upper bead	2 lower beads
3	one upper bead	1 lower bead
5	two upper beads	3 lower beads
6	two upper beads	2 lower beads
7	two upper beads	1 lower bead

Case 3. - There isn't room for the digit to be added to the column. In this case we use complements. See table below.

To add *******	subtract
1	Ɛ
2	X
3	9
4	8
5	7
6	6
7	5
8	4
9	3
X	2
Ɛ	1

AND ADD ONE TO THE COLUMN TO THE LEFT OF THE COLUMN BEING WORKED ON.

In adding this carry to the column on the left, conditions as in case 1, 2, or 3 will apply.

In subtracting the complement, sometimes the bead values will not allow a simple removal of beads from the center bar. Then WE FOLLOW THE TABLE BELOW:

To subtract ****	Subtract *******	and add
1	one upper bead	3 lower beads
2	one upper bead	2 lower beads
3	one upper bead	1 lower bead
5	two upper beads	3 lower beads
6	two upper beads	2 lower beads
7	two upper beads	1 lower bead

The above are the only numbers that offer this problem.

EXAMPLE. ADD 14714 and 9832

(1) Set in 14714 from right to left; i.e., set in 4 in far right column, then set in 1 in next column to the left, etc.

(2) Now add the units 2 by moving 2 units beads up.

(3) Add the dozens digit 3 to the next column to the left. Here Case 2 applies. So to add 3 we add 4 and subtract one.

(4) Now we add the gross digit 8. Here Case 3 applies. To add 8 we subtract the complement 4 and carry one to the column to the left.

(5) Finally we come to the last digit, a 9. This is also Case three but we must use the modification.

We must subtract the complement 3 and add one to the column on the left. We only have one lower bead pulled in so--- we subtract 4 and add one. After this don't forget the carry mentioned above.

The answer is 22346

Subtraction follows the same general pattern with Case 1, 2 and 3 rules modified by changing the word add to subtract and vice versa.

Multiplication and division are accomplished as one does the problem on paper, using the abacus to hold the numbers to be added and/or subtracted. Square root and further integral roots may be computed on an abacus. This is left to the reader as an interesting problem, though if sufficient interest is stimulated by this article, the writer will submit a further article on multiplication and division as well as roots.

THE *NEW YORKER* REPORTS THE ANNUAL MEETING

Among those present at the Annual Meeting in the Carnegie International Center was Paul Brodeur, who is - it develops - a member of the staff of the New Yorker magazine. The latter part of the evening, he was quite busy, circulating among the officers and members, asking searching questions about the Society and about duodecimals.

The fruit of his careful harvesting is an article, "Do, Gro, Mo," which appeared in the New Yorker for 5 August 1961. The pleasant clarity of Mr. Brodeur's presentation of the idea of duodecimals testifies to his professional competence.

As this is the first appearance of duodecimal material in a magazine of wide general circulation in the twenty seven years since the Atlantic Monthly published, in 1934, the article "An Excursion in Numbers," by Mr. Andrews, the reaction of the public to this new article is awaited with deep interest.

Our compliments to the New Yorker on this fresh demonstration of its flair for the coverage of the subtler developments that are of unusual importance.

MERITS OF THE DOZENAL NUMBER SYSTEM WARRANT THE CHANGE

by Richard A. Sexton
868 Blaine Ave.
Janesville, Wis.

As long as man has counted, he has naturally used his fingers. No records tell how counting began. But it is rather clear from studies of primitive peoples, and from how children learn to count, that fingers were and are the basis of our number system. Now ten is doubtless a useful number of fingers to have (or that would have been altered in evolution), but is it a good basis for mathematics?

Unfortunately, our number system is taken for granted, and seldom analysed. Like many things, it is "best" because we have it, we have had it, and presumably always will have it. Few people think of the origin of our number system, or whether a better has been offered. But tradition does not make a thing good, and when better things are devised, they should be tested if we are to progress.

Improvement must be demonstrated. Defenders of the ten-system argue that it makes "decimals" possible, whose benefits are admitted. However, any number system offers the same numerical operations. Only the "place value" is changed. Then too the metric system of measures is held up as the acme of logical simplicity. It is of course an ordered system, which is an improvement. But some things, such as the day, the week, the years, - are not conveniently decimated. Were we to change to the twelve base, our familiar measures fit readily into an ordered system with the advantages of the metric system and few of its faults.

Admitting the unstudied origin of the ten base, what base would an impartial analysis find best and most useful? The historic record favors the twelve rather than ten, the twelve-based units finding wide application because of their easy divisibility into the most common smaller parts. Many things at the store, for example, come in dozens, and by the dozens dozens, or gross (the word grocer originates with "one who deals by the gross"). The twelve-month year nicely accommodates the four seasons and quarterly interest, easily subdivided into monthly charges. The week has six working days with each day divided into two sections of twelve hours. Because of this division, work can be done in shifts of 12, 8, 6, 4, 3, or 2 hours and come out evenly.

In dividing the hour and minute, the flexible twelve was combined with the ten which we already "had on our hands". Sixty was chosen as the lowest number on which twelve and ten meet. The division of the circle attests another such preference, for North South, East and West would not fit with any subdivision by ten. In linear measure, most obviously, there is the yard with three feet, each with its twelve inches.

Division by twelves was evolved in olden times as the easiest to use. What other number can supply the most-needed divisions. Ten can be divided only by two and five, while twelve can be divided by two, three, four and six. No other base can do as well. A final demonstration might be the percentage system. Twice as many ratios come out evenly when based on the gross instead of the hundred. One-third becomes 4 dozen instead of the 3.333 etc., and one-fourth becomes three dozen. The mariner shows his preference in his adoption of the fathom of six feet and the cable-length of 120 feet.

From this survey it would appear that the most useful base is twelve. Since tradition actually favors twelve, the choice is not the dropping of a "tried and tested system", but the selection of a tried and tested system to use and build upon.

One point, perhaps considered "crushing" by its adherents, is valid. It would, they say, be difficult to convert from the ten to the duodecimal system, if not impossible. But is progress to be abandoned because it is not easy to change? If that principle ruled, we would today be without running-water, electric lights, and automobiles.

A more accurate analogy is found in the overwhelming change which occurred in (of all times), the Middle Ages. Life then discarded the Roman Numerals for the radically new Arabic symbols, and place-value. This tremendous adjustment occurred in the days of wide-spread ignorance and illiteracy. Could one so insult, or more devastatingly indict modern life and learning, than to say that we could not change the place-value in our numbers from ten to twelve.

How to smooth the transition? It is suggested that the duodecimal system be taught in the schools, as the metric system is now taught; and its application in mathematics and in the laboratories be explored. Both systems could be taught concurrently, as the English and the metric measures are now taught. With familiarity, the advantages of the ordered system would earn duodecimals their way into popular preference.

There are many instances today of basic revisions and modernizations, as Turkey's changes in letters and customs, to illustrate the "giant step." The responsibility is ours, who see the advantages of the duodecimal system, to support and promote its use.

DOREMIC SCIENTISTS VOLUME, MASS, AND MONEY

by Henry Clarence Churchman
403 Wickham Bldg., Council Bluffs, Iowa

INTRODUCTION

Perhaps you would be puzzled if you came upon:

A Book on Dozenals beneath the Bough,
  A Jon of Wine, a Kalk of Bread---and Thou
Beside me singing in the Wilderness---
  Oh, Wilderness were Paradise enow!

Or, more simply:

Ah, take Gold Renions, let the Credit go,
  Nor heed the rumble of a distant Drum!

Only three or four dozen years ago anything operated by employment of electricity was classified in the United States of America as "electric." And the French system of decimal measurement was at the same time identified as "metric." All were thought to be eternal and the last thing in science. Today in the U.S. almost everything electric, no matter how humble, is identified by the glorified term "electronic."

Possibly the time has come to advance a "metronic" classification of the universal system of scientists dozenal dimensions, weights, volume, time, and angles. Weekly and monthly newspaper and trade magazines published in the U.S. today are quite barren of electric classifications and literally bulge with the electronic news. The whole earth appears to have been translated overnight from a "tric" to a "tronic" cycle.

In timely fashion THE DUODECIMAL SOCIETY OF AMERICA already has published portions of the Scientists Metronic Scale((August 1959 BULLETIN, p. *19*, and August 1960 BULLETIN, p. *1X*), which copyright is held for the use of all mankind and is forever dedicated to the public, as free to use as the Holy Father's encyclicals, "ad urbi et orbi."

PREVIEW OF METRONIC DIMENSIONS

It is generally assumed that the METRIC system is today successfully applied to measurements of dimension, volume, and mass. But its early attempts to divide circles and time into decimal subdivisions have come to naught by reason of their inexactnesses, including decimal divisions of days, months, years, and, of course, circumferences and angles. In this age of precision, all approximations seem wholly unscientific.

Fortunately for science in this mechanized age the METRONIC system may be readily applied to measurements of dimension, volume, mass, time, and circles. And more precisely to dimension, volume, and mass than the metric system accomplishes today, if for no other reason than that the smaller the space between equal markings on a ruler the more precise the measurement can be stated. There is a smaller space between the divisions of twelve equal parts than of ten equal parts of any scale. The symbol SM (Systeme Metronique) may be used to designate the system of units based on the metron, kalk, jon, naire, eremidie, and related units.

The "dominante" unit of length in metronic dimensions is a dozen-base distance exactly equal, decimally, to 131 383 296 international feet, each foot equal to 30.48 international centimeters exactly. This is the precise length of *£38 000 000;0* (three dozen and eight bimifut) units. For bimifut units see The Duodecimal Bulletin July 1956, Doremic System of Measures and Weights.

At the same time, one "dominante" unit is the length of an assumed great circle of the earth exactly equal, decimally, to 40 045 628 620 800 international micron units, or in terms of angstroms ten thousand times that many units. This great dimension unit actually is one-tenth of the occasional distance between the rim of the moon and the rim of a glass in your hand. This latter distance varies of course from hour to hour and from day to day. But by and large, the moon is a neighbor only ten dominantes away from your window.

Now if we reduce one dominante by *10;−4* (the minus fourth power of one dozen, or decimally to 1/20736 part of 131 383 296 international feet) we achieve a length known as one "nante" or one "domimetron", equal to 6336 such feet or 1.9312128 km exactly. This metronic scientists' unit of length is sometimes called an AIR MILE or a naire mile. It is the same dimension as one naire arc of an assumed great circle of the earth.

PARTIAL TABLE OF NANTE DIMENSIONS

DOREMIC DIMENSIONS		DOREMIC SYMBOLS		INTERNATIONAL ENGLISH VALUES		METRIC VALUES		METRONIC VALUES
1 eminante,	shown	N 0;001,	equals	44 in.,	or	1.1176 m	or	1 dometron
1 erenante,		N 0;01,		44 in.,		1.34112 dam		1 remetron
1 edonante,		N 0;1,		528 ft.,		1.609344 hm		1 mimetron
1 nante,		N 1;0,		6336 ft.,		1.9312128 km		1 domimetron

One dometron is exactly equal decimally to 11 176^6 or 11 176 000 000 angstroms.

Let us digress for a moment. It seems unnecessary to invent anything in dozenals. It is only required that we dig into the past to find countless golden treasures. By some studied sequence out of all time, which this writer has been unable to fathom, one-twelfth of an air mile is the equal of one-tenth of 5280 international feet, and in terms of dimension is equal to one "edon". One edon is the length of 528 international feet of 1.609344 hm exactly. It is the smallest unit of distance measured on most U.S. automobile speedometers, generally described as one-tenth land mile or one-tenth Canadian statute mile.

In the first quarter of 1961 the French opened the first portion of a toll road along the Rieviera, near Cannes. It was surveyed and completed in terms of meters, of course, but the reported length was about 14.4 land miles, which equal 144 edons---one dozen domimetrons or twelve air miles. Doremic dimensions are not "foreign" to any nation.

It seems a shame to call this relation of air mile and statute mile no more than a coincidence. A brilliant, old fashioned, duodecimal mathematician in some English graveyard, I believe, lies in his dust unhonored by the parliament which he so well advised on the proper length to fix the English statutory land mile so many years ago.

Why did he urge the English parliament to add 56 paces to the Roman mile of 1000 paces? Why not 55? Why not 60? Why any at all? With each pace equal to 60 inches (two 30-inch steps), the Roman mile was replaced by the English statutory land mile which is equal to 5280 feet, or 1760 yards, or 320 rods, or 8 furlongs, or ten edons---ten edonantes, if you will.

It is no mere coincidence there are exactly eleven dozen dozen dozen dozen dozen dozen (*£ 000 000;0*) international feet in a quarter great circle of the earth. It is no coincidence only that in a dimension exactly equal to ten such great circles of the earth (forty times *£ 000 000;0* international feet) there are exactly one dozen dozen dozen dozen dozen (*100 000;0*) units, each equal decimally to 5280 international feet.

It is much more than coincidence that in a dimension equal to one great circle of the earth (4 times *£ 000 000;0* international feet) there are exactly one dozen dozen dozen dozen dozen (*100 000;0*) units, each unit equal to one edon, one edonante, or one mimetron (528 international feet or 1.609344 hm exactly). Clearly, our own knowledge is the amassed thought and experience of innumerable minds, without whose preliminary work we could accomplish little.

If next we reduce one nante (one domimetron or 1931.2128 m) by *10;*$^{-3}$ (the minus third power of one dozen, or decimally to 1/1728 part of 6336 international feet) we achieve a length known as one DOMETRON or one DOMETRE equal to one eminante or 1.1176 international meter or 44 international inches EXACTLY, each inch equal to 2.54 cm.

The table of dimensions from eminante to nante correlated with international English and French dimensions and their metronic equals by name, should be memorized. The Humphrey dozenal point (;) is relied upon in this paper to indicate the digits which are dozenal and not ten-based units.

KRYPTON 86 IN RELATION TO DOMETRON

One dometron is exactly equal, decimally, to 44 international inches which are equal to 1.1176 international meter. The dometron therefore may be readily compared with inches and meters.

The dometron is equal to a precise number of lightwave lengths of the orange line of glowing krypton 86 under certain controlled conditions equally applicable in ascertaining the length of one international meter, in 1960 achieved by multiplying 1 650 763.73 by 1.1176 to equal 1 844 893.544 648 wavelengths.

Eventually the dometron, like the meter, will be determined by a certain number of wavelengths, and neither one will be based on the metric bar housed at Sevres near Paris.

For instance, one metron (9.31-1/3 cm) is quite precisely equal, dozenally, to *74 Ɛ79 0* krypton 86 lightwaves. And one edomimetron therefore would equal nearly 7-5/12 waves, decimally speaking. One ebimimetron equals, dozenally, *0 074 Ɛ79 166 519 Ɛ2* part of one such krypton lightwave.

Now that the principle of a wavelength standard is accepted internationally, the indefatigable search for a suitable wavelength should continue. In the meantime the dometron must stand only on its defined relationship to the meter 1.1176 m).

KILOGRAMS AND KALKS AND CABBAGES

Conjure with me a cube which is one dometron in length on every edge. That is to say, 1.1176 m. For the purpose of determining mass, one public dometron of a certain controlled substance might be called one "Mikalk".

One twelfth of one dometron is of course the equal of one metron. And one cubic metron of mass may be called one "Kalk". Seventeen hundred twenty-eight "kalks" are decimally equal to one "mikalk".

The stem word Kalk is a short version of Kalka'b, derived from the Latin calx or calculus, a stone; and the Arabic word ka'b, cube. Hence literally, a stone cube. Also see khan (Turkish), khana (Persian), khangi (Hindu), a cube. Phonetically, ka'b has the sound of the English word cab, which also suggests a cube, a cubic house, a humble cabin in which President Abraham Lincoln was born or a cabin on a ship. A Gaelic word for stone is kelk. A kelkab might describe a stone cube for the Celts.

The idea associated with a 3-dimensional block of stone is closely aligned with the idea of bulk. Many staples in commerce are packaged and marketed in containers of known capacity, but were perhaps originally determined from the weight or mass of the product when packaged. When not pre-packed this same product might be sold in bulk; that is to say, the weight or mass of the amount desired by the purchaser is determined, and may vary, for each separate purchase; the total price is computed in bulk sales usually by weight or mass unit, and hence it may be said we sell or measure by the bulk or block, by "bolc" or bloc.

This is also true of many fruits and vegetables such as potatoes, melons, apples, oranges, and cabbages (and other greens) sold by weight to consumers.

Thus, if block or bloc or bulk or "bolc" suggests measurement by weight, then there remains only the problem of fixing the size or value of the unit, more particularly one kalk, kelk, khan, ka'b, or kalka'b.

We might achieve greater accuracy if we carefully erect a receptacle capable of retaining one cubic dometron of volume without change of shape, pour into it some easily procured, processed, and controlled liquid substance, and determine its mass in terms of 1728 (*1 000;0* or one dozen dozen dozen dozen) kalks, or perhaps 2,985,984 (*1 000 000;0* or one dozen dozen dozen dozen dozen dozen) emikalks. Of course, one dozen dozen dozen (*1 000;0*) kalks would equal the mass of one mikalk, the mass of one cubic dometron of a given controlled substance.

PRESENT UNITS COMPARED

One kilogram, we know, is approximately equal to 2.205 international pounds. Let it be noted that one cubic metron in mass (1 kalk) equals quite nearly 4/5 kilogram. That is to say, one cubic metron equals about 0.80782 part of one cubic decimeter precisely, or between 80% and 81% of one kilogram. Oddly, perhaps, the computed mass of the planet Venus is about 81% of the earth's supposed mass.

One mikalk (abbreviation shown mk 1), or one cubic dometron (exactly 1.1176 m^3) of a certain controlled substance, will weigh approximately one and one-half short tons or between 3000 and 3100 international pounds (precisely 3079.9499 pounds). A "mikalk" pickup-truck, camion, or lorry, is very close in capacity to what we call in the U. S. a "ton-and-a-half-pickup." A capacity of 27 tons of rock is almost equal to 18 mikalks or one and a half "domikalks" of payload.

Eight rekalks (rk 8), or 2/3 of one mikalk, equal about 2050 international pounds. One rekalk (rk 1) equals better than 256 pounds. One dokalk (dk 1) equals between 21 and 22 pounds or nearly 10 kg. Five dokalks (dk 5) equal better than 105 international pounds but not quite 50 kg.

"Zilions" of transactions may occur in the kalk and dokalk areas in selling seed and grain. For instance, a two-dokalk sack of grain or seed would appear to be suitable for a man, woman, or a "dozenager" to stack or to lift from storage to machine. Either a dokalk or a half-dokalk of potatoes might be pre-sacked at a consumers market. A half-kalk might be fixed by state legislatures as the minimum weight of a loaf of bread (a little better than fourteen ounces avoirdupois). A kalk of bread would equal a double-loaf.

Weight of persons might be more precisely expressed in edokalks (about 2-3/8 ounces avoirdupois or 67 grams), and their height in edometrons (about .3 inch or 7.75 mm). A person weighing 150 pounds weighs about 1010 edokalks. But a guess might be stated in kalks---60 kalks is about 105 to 110 pounds. Ninety kalks is about 155 to 160 pounds. A person weighing about 250 to 260 pounds weighs about one rekalk.

One metric ton is, of course, equal to about 2200 international pounds, or nearly 72% of one mikalk. Mikalks are substantially larger than metric tons; and emikalks are substantially smaller than grams. In fact the more minute the measurement of mass or volume becomes, the greater is the precision in the metronic system. A kalk is about .8 of a kilogram.

The foregoing relationships are based on the assumption that we shall use a like substance and the same controls but a different dimension to determine the kalk and the kilogram under laboratory conditions.

Please turn to page 1Ɛ

A RESECTED DODECAGON

by Rev. Joachim Watrin, O.S.B.
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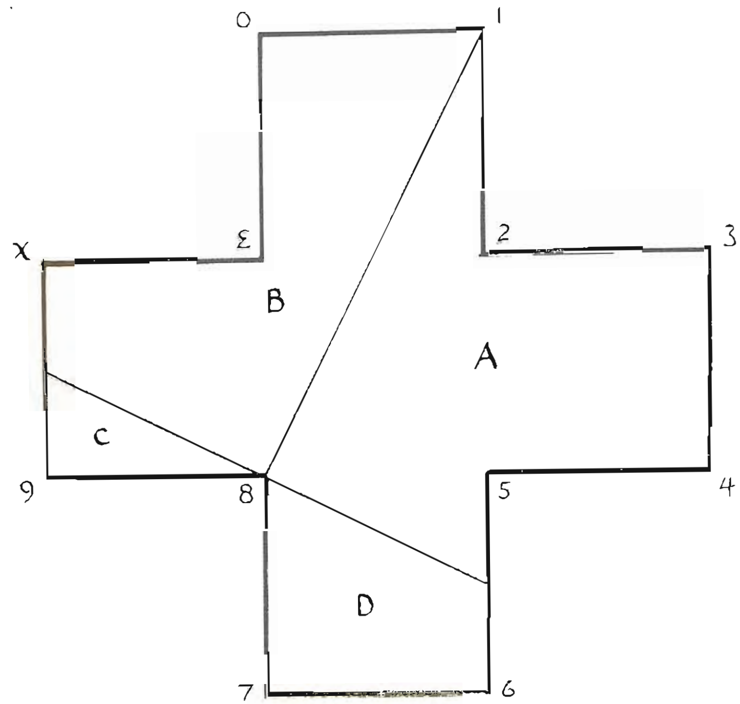

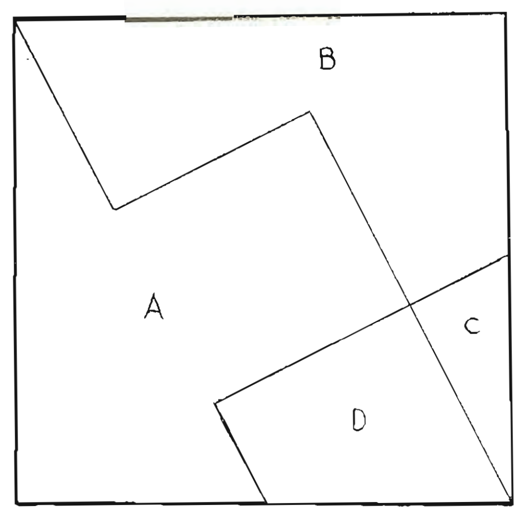

A DUODECIMAL THEOREM OF THE POWERS OF TWO

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THEOREM: The digits appearing in any place, in the duodecimal sequence of increasing powers of 2, form repeated n-tuples such that, for place p, $n = 2(3^{p-1})$, for powers of 2 (greater than 1), requiring the use of that place.

Since 2^{2n} is congruent to 1, modulo 3, and 2^{2n+1} is congruent to 2, modulo 3, it is clear that the digits in the first place, $(p = 1)$, will consist of repetitions of the ordered pair $(4,8)$. In duodecimals, numbers ending $0,3,6,9$ are divisible by 3. All powers of 2, greater than 1, are congruent to 0, modulo 4; and hence are congruent to 4 or 8, modulo 10. For $p = 1$, $n = 2(3^0) = 2$.

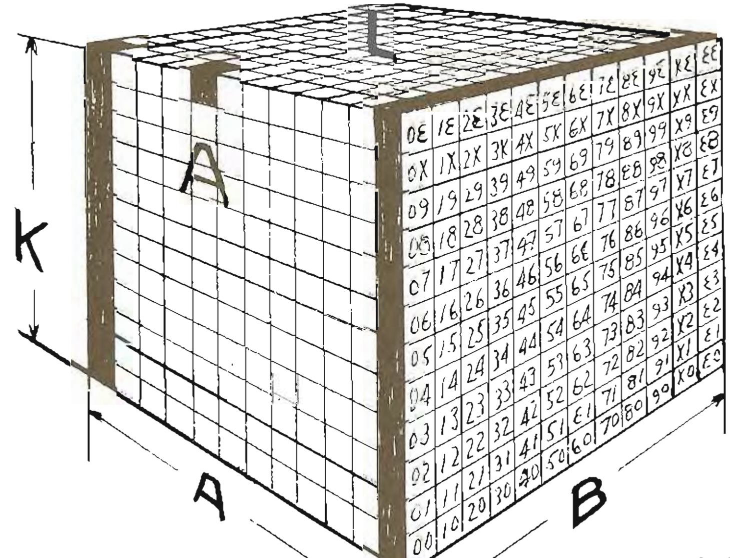
Suppose it be established that $n = 2(3^{p-1})$ for all values of p from 1 to q. For some value of 2, a 1 will first appear in the $q + 1$st place. It will be followed by some one of the $m = 2(3^{q-1})$ digits of the m-tuple of digits forming the sequence of digits in the qth place. Let m_i represent this m-tuple; define $R(m_i)$ so that $R(m_i) = 1$ if m_i is 6 or more, and $R(m_i) = 0$ if m_i is less than 6. Let d_i represent the digits in order in the $q+1$st place. Then d_{i+1} is congruent to $2d_i + R(m_i)$, modulo 10, for the m-tuple of $R(m_i)$ corresponds to the m-tuple of m_i. This procedure will establish a sequence of $m + 1$ digits for d_i starting with $d_1 = 1$. d_{m+1} is congruent to 2, modulo 3, and d_{2m+1} is congruent to 3, modulo 3, which will be established. d_1, d_{m+1}, d_{2m+1}, are all congruent to 1, modulo 4. This establishes a sequence with 3 times m members which thereafter repeats. Hence, for $q+1$, $n = 3n_q = 2(3^q)$. By induction, the theorem is proved as soon as the claimed congruencies are established.

For $p = 1$, observe the powers of 2 from 2^4 to 2^9:— *14, 28, 54, X8, 194, 368*. Clearly d_m is congruent to 1, modulo 10; d_{m+1} is congruent to 5, modulo 10; and d_{2m+1} is congruent to 9, modulo 10. (This is equivalent to the two congruencies claimed, modulo 3, and modulo 4.) Suppose that this holds for all m up to and including $p = q$. For $q+1$, there exists a sequence of m q-digit numerals to the right of the pth place that infinitely repeats, and adds precisely one more to the digit which would otherwise appear in the pth place; for d_1 congruent to 1 implies d_{m+1} congruent to 2 and d_{2m+1} congruent to 3 or 0, modulo 3. Consider the

numbers $N = 2^x$, $N_{m+1} = 2^y$ and $N_{2m+1} = 2^z$, corresponding to the appearance of d_1, d_{m+1}, and d_{2m+1} respectively. $N_{m+1} - N = 2^x(2^{m-x} - 1)$. From the identical numerals to the right of d and d_{m+1}, the difference has zeros to the right. Since there are less than 2^x zeros, $d_{m+1} - d$ is congruent to 0, modulo 4; d_{m+1} is congruent to 1, modulo 4; and similarly d_{2m+1} is congruent to 1, modulo 4. This completes the proof.

DOREMIC SCIENTISTS VOLUME, MASS, AND MONEY

(Continued from page 16)



1 DOMETRON is 11.176 dm in length and is subdivided into 12 equal parts.

1 METER is 10 dm in length and is subdivided into 10 equal parts.

1 METRON is 9.31-1/3 cm in length and is subdivided into 12 equal parts, decimally speaking.

1 DECIMETER is 10 cm in length and is subdivided into 10 equal parts, decimally speaking.

1 MIKALK is the mass of 1 cubic DOMETRON of a certain controlled liquid and location. If the above cube represents one mikalk, then the single minor cube above A is equal to one KALK or one cubic METRON. And the column of one dozen minor cubes adjacent to K is equal to one DOKALK or a dozen cubic metrons. The gross of minor cubes with faces numbered duodecimally from 00 to EE, appearing above B, is equal to one REKALK or a dozen dozen cubic metrons.

1 KALK is similarly subdivided into a great gross of units (1728), one of which is called one EMIKALK, and a dozen of which units is called one EREKALK. One EDOKALK is equal to one gross of emikalks or one-twelfth of one cubic metron of controlled liquid.

If the above cube represented one KALK or KALKAB (from the Latin calculus, a stone; and the Arabic word ka'b, cube), then the minor cube above A would represent one EMIKALK or one cubic EDOMETRON. And the column of one dozen minor cubes adjacent to K would equal one EREKALK or a dozen cubic edometrons. The gross of minor cubes with faces numbered from OO to EE, appearing above B, then would be equal to one EDOKALK or one gross of cubic edometrons.

Our precision must be greater than when the liter was measured, for while the liter is said to be 1000 cubic centimeters, actually we find it written in textbooks carefully prepared and edited that "one liter equals 1000.028 cubic centimeters, but unless work is of high precision, one liter equal to 1000 cubic centimeters is satisfactory and much easier to use." See page 143, USING MATHEMATICS, 2nd edition, copyrighted 1960 by Kenneth B. Henderson and Robert E. Pingry, as one example.

We have better tools today and the exact volume and mass of one cubic dometron must be determined with scientific controls; perhaps the mikalk (one cubic dometron) should be our unit of mass, and the kalk (one cubic metron) be fixed, decimally speaking, at 1/1728 part of it.

LITERS AND JONS AND KALKS COMPARED

Conjure once again a cube which is one dometron (exactly 1.1176 m) in length on every edge. For purpose of volume let us designate this capacity as one cubic dometron or one "mijon".

Internationally we should be prepared to recognize the Mijon if it be spelled or pronounced either mijohn, mijeanne, migian, mijan, or plain mijon. The prefix sign or symbol is a lower case "j" for jon or jeanne---some might think it stands for jar or jug, but jon would seem to be a more universal word than either of them for use in fixing the standard capacity of jugs and jars, bottles and cans, baskets and bushels, cartons and containers, of every nature and wet or dry.

The descriptive stem jon, jeanne, john, or jan is in no sense intended to refer to a person. It is derived from the phonetics of a Persian word anciently associated with volume, vessel, or container of an improved type, brought into European tongues as demijohn, damejeanne (Lady Jane), or damagan. There is no intentional relationship in size or volume between the ancient damagan and a domijon. They can not be inadvertantly mistaken since their difference in volume is tremendous.

It may be observed that one cubic metron (see Table of Comparisons of Metronic Dimension, Volume, and Mass), equal in volume to one jon, equals quite nearly 4/5 liter or 4/5 of one cubic decimeter. One cubic metron (9.31-1/3 by 9.31-1/3 by 9.31-1/3 cm) equals about 0.80782 part of one cubic decimeter or between 80% and 81% of one liter, to be less precise. This result also may be obtained by taking 1/1728 part of 1.1176 m^3.

Now if one liter equals 1.056 U. S. quarter gallon or 61.026 cubic inches, then one jon (which is equal to about 80% of one liter), equals better than 49 cubic inches (7 by 7 by 1 international inches) or slightly above one-fifth U.S. gallon of liquor, commonly called a Fifth in the U.S. There is a droll saying that where you see four statesmen gathered in spirited discussion privately, you will usually find a fifth. The Fifth very nearly equals 94% of one jon, and furnishes the easiest visual rough comparison.

That 1 U.S. gallon is equal to about 94% of 5 jons is shown by the fact that one U.S. gallon equals 231 cubic inches by definition and that five jons equal about 246-1/4 cubic inches. One-fifth U.S. gallon of liquor equals 46-1/5 cubic inches exactly, and one jon equals about 49-1/4 cubic inches (49.2479 cu. in.).

It should, perhaps, be noted here that kitchen liquids produced and packaged or bottled domestically in the U.S. are usually conveyed in gallons, quarts, pints, and half pints; whereas liquids imported into the U.S. from other English-speaking countries and European nations are quite generally bottled in one-fifths of a U.S. gallon, sometimes labeled on a bottle fractionally as "4/5 Quart". See Canadian, Irish, English, French, German, and Scottish whiskies, brandies, wines, etc., in U.S. stores.

There is a sound reason for the "4/5 Quart" container. Six times one-fifth U.S. gallon equals 277.2 cubic inches exactly---very close indeed to one British Imperial gallon. And it is a happy circumstance that a case of Fifths contain a dozen bottles---roughly 2 British gallons---whether bottled in England, France, Germany, etc.

Six jons equal about 295-1/2 cubic inches, about eighteen cubic inches larger than one British Imperial gallon. The British gallon is about 94% of a Half Dojon. A half dojon and 6 jons are of course equal. A dozen jons equal one dojon or one case of liquid in the New Order, in the metronic system.

Except perhaps to reach an exact relationship of 6 to 5 between one British Imperial gallon and one U.S. gallon, or to make the French liter exactly equal to one cubic decimeter or 1000 cc. no effort should be made to alter the U.S. or British gallon or the French liter as such now obtains. Rather let liters and gallons rest on their own shelves, and let the jon take over when the people are ready.

Perhaps in place of gallons or liters we shall some day quote prices and purchase oil and gasoline or petrol or benzine by the jon or the dojon. In the U.S. today the price per gallon is quoted to the public while the liquid itself is actually metered out and paid for, not by the gallon or quart or ounce, but by the cent---decimally.

If you, for instance, are having your tank filled with gasoline and the meter stops at $5.87, or even lower, what attendant will not "squeeze" enough more through the pump to equal an even $6.00? In all events he will stop the liquid flow on a whole cent and not on one-tenth cent or other fraction of cent or gallon. We may think of price in the old terms of gallon, but the service attendant measures it out in the U.S. and Canada in terms of---money.

METRONIC MONEY

One of the first projects of a duodecimal society should be to put a nation's monetary system on a simple dozenal base. And I mean immediately, before England loses her shillings, her dozen pence, and the many blessings in the field of subdivisions which that system furnishes the Englishman and might furnish to all of us.

Already in the U.S. (it has reached to the legislatures in fixing state officials and teachers salaries) complaints are spreading that the machine-accountant, and now the automatic-chequewriter, is unable to divide a $10,000, $20,000, $30,000, or even a $5,000 teacher's annual salary into semi-monthly or monthly equal instalments without running up against the fractions of 1/3 or 2/3 cent. Unfortunately a decimal-system of money is unable to work in thirds of a cent, a dollar, a century, or a grand. There simply is not a coin to fit, or a decimal-machine to figure, one-third of $1,000, $100, $1.00, or one cent.

In this age of precision and automation, look not to the decimal-money system to divide unity or a circle (or $1000) into twelve or twenty-four equal parts, then multiply by twelve or twenty-four again to achieve unity or one circle or $1000 PRECISELY and EXACTLY.

We can by state statutes legalize governmental use of the Metronic Table of Equal Money Values in their relation to U.S. legal tender as set forth in the table, for the sole purpose of fixing annual salaries in contracts of hire; provided payment of said salaries is made only in legal tender of the realm and that no metronic money unit smaller than one Nion shall be included in any person's annual salary.

Then we can fix the salaries of all our teachers, state employees, federal employees and mebers of the armed forces, in terms of Dominions and dozenal fractions thereof---with perhaps eventually a GOLD renion or

METRONIC TABLE OF EQUAL MONEY VALUES

METRONIC VALUE NAMES	PEGGED NUMERICAL CONTENTS	GOLD PEGGED MARKS, FRANCS, SHILLINGS, GUILDERS, RUBLES, ETC.			PEGGED U.S. OR CANADIAN DOLLARS
One Dominion	(dozen doz doz doz Nions)	s 20736	P		$4,976.64
Half Dominion	(six doz doz doz Nions)	s 10368	P		2,488.32
Quarter Dominion	(three doz doz doz Nions)	s 5184	P		1,244.16
One Minion	(one doz doz doz Nions)	s 1728	P		414.72
Half Minion	(six dozen dozen Nions)	s 864	P		207.36
Quarter Minion	(three dozen dozen Nions)	s 432	P		103.68
One Renion	(one dozen dozen Nions)	s 144	P		34.56
Half Renion	(six dozen Nions)	s 72	P & G		17.28
Quarter Renion	(three dozen Nions)	s 36	P & G		8.64
One Donion	(one dozen Nions)	s 12	P & G		2.88
Half Donion	(six Nions)	s 6	P & S		1.44
Quarter Donion	(three Nions)	s 3	S		.72
One Nion	(one Nion)	s 1	S	pegged at	.24
Half Nion	(six Edonions)	s 1/2	S		.12
Quarter Nion	(three Edonions)	s 1/4	C		.06
One Edonion	(one Edonion)	s 1/12	C		.02
Half Edonion	(six Erenions)	s 1/24	C		.01
Quarter Edonion	(three Erenions)	s 1/48	A		.005
One Erenion	(one Erenion)	s 1/144	A		.0016-2/3
Half Erenion	(one-half Erenion)	s 1/288	A		.0008-1/3
Quarter Erenion	(one-quarter Erenion)	s 1/576	A		.0004-1/6

NOTE: P indicates paper money; G denotes gold coins; S silver coins; and C copper coins. A indicates subdivisions for account purposes, tax rates and levies, etc. The Erenion and the Quarter Edonion (like the farthing and the U.S. mill) have no actual existence as coins. One gold renion would contain eleven-twelfths gold and one-twelfth silver alloy, total weight equal to a certain number of "edomikalks" of metronic mass to be determined unilaterally by any one government initially, or by a concert of powers. The s preceding any digit is the metronic money symbol for Nion, just as the $ sign is placed before U.S. dollars.

two carried in the pocket, although gold is not an absolute requirement. Let an assistant now receiving $5,000 a year have his stipulated annual salary fixed at "one Dominion ($4976.64) and one Renion ($34.56)", a total annual wage of $5,011.20 in legal tender, which any electronic chequewriter can divide into 24 equal instalments. Another possibility would total $5000.16 if we utilize Dominion, Half Renion, Donions, and Nions.

In improvising a Metronic Teachers Table of Equal Money Values we should not, as a general rule, reduce anyone's salary in order to reach a properly divisible total, but increase it substantially. Teachers are then compensated for their effort to study and understand the table; and regents and board members are more likely to go along with the plan if their personnel are more contented and at the same time they save the expense of resetting the electronic equipment at the end of every semester, half year, or quarter.

Initially we shall pay our state, county, city, and federal employees in U.S. or Canadian dollars and cents (European employees in marks, francs, shillings, guilders, rubles, etc.) but fix their pay in terms of dominions and dozenal fractions thereof no smaller than one nion. Through this method of fixing annual salaries the treasurer's office may automate and improve its bookkeeping system at will, and install all the salary paying machines industry can devise to save labor and time, provided salary instalments are paid no oftener than twice a month.

Let schools and universities, as recognized possessors of intelligence and know-how, take immediate steps to initiate this system. Dominions for progress---not one Erenion for the backward school personnel director. If the terms "Dominion" and "Renion" tend to cloud common knowledge of the actual annual salary of teachers it might enable boards and regents to increase these salaries to a just compensatory level without the present adverse pressure.

APPEARANCE OF CUBIC DOMETRON

The cubic dometrons ($1.1176m^3$), and hence either the mijon or the mikalk, is about 1-2/5 times the capacity, mass, or volume of one cubic meter. One cubic meter is about seventy-two percent, or eight dozen and and eight per gross, of one cubic dometron. Giant earthmoving machinery in the U.S. today makes the cubic dometron desirable for engineers in figuring the capacity mass, or volume of earth moved or to be moved---especially since twelve dometrons equal 44 feet or one remetron, twelve remetrons equal one-tenth land mile or one Edon, and one square Edon equals one Garden of land or one percent of one square land mile. One Garden of land is also equal to one per gross of the Champ or Field of land---and the champ is equal to a square area 6336 by 6336 international feet or one percent of 4 congressional townships. Thus, the engineer or surveyor may solve his area problem by per cent or by per gross, in the congressional township areas of the United States, or comparison therewith.

Getting down to the size of articles in hand, one cubic metron and hence one jon or one kalk is about 4/5 of the capacity, mass, or volume of one kilogram, liter, or cubic decimeter.

And moving to even more minute matter, note that one cubic "edometron", the equal of one emijon or one emikalk, is substantially less than HALF of the capacity, mass, or volume of one cubic centimeter, one gram, or one milliliter. This alone promotes precision in describing small objects.

TABLE OF COMPARISONS OF METRONIC MASS, VOLUME, DIMENSION

DOZENAL WEIGHTS		DOZENAL VOLUME		DECIMAL VALUE		METRONIC VALUE	
1 domikalk	equals	1 domijon,	equals	12 cubic dometrons,	shown	*1* dozen	$m10;^3$
1 mikalk	"	1 mijon,	"	1 cubic dometron,	"	*1*	$m10;^3$
1 rekalk		1 rejon,		144 cubic metrons,		*1* gross	$m1;^3$
1 dokalk		1 dojon,		12 cubic metrons,		*1* dozen	$m1;^3$
1 kalk		1 jon,		1 cubic metron,		*1*	$m1;^3$
1 edokalk		1 edojon,		144 cubic edometrons,		*1* gross	$m0;1^3$
1 erekalk		1 erejon,		12 cubic edometrons,		*1* dozen	$m0;1^3$
1 emikalk		1 emijon,		1 cubic edometron,		*1*	$m0;1^3$
1 ebimikalk		1 ebimijon,		1 cubic eremetron,		*1*	$m0;01^3$
1 etrimikalk		1 etrimijon,		1 cubic emimetron,		*1*	$m0;001^3$

In order to compare graphically the volume or mass or capacity of one cubic metron, one dozen cubic metrons, and one gross cubic metrons, in relation to one cubic dometron, let us study the mijon or mikalk standing with its 1728 jons or kalks contained in one cubic dometron. Note that it is 1.1176 m in length on every edge, and that every edge is marked to indicate a dozen equal subdivisions. The edge of a cubic meter is shorter and would show ten equal parts instead of twelve. For this reason alone, the cubic dometron is larger than the cubic meter, and the cubic metron is smaller than the cubic decimeter.

In designating the three equal dimensions of a graphic cube design, we might use the letters Kappa for height, Alpha for depth, and Beta for breadth. We could of course use any other letters or symbols, but together in that order they spell KAB and do in fact illustrate a Ka'b or cube.

Next let us compare the mass or volume of one jon, kalk, or cubic metron with one cubic decimeter. The cubic decimeter (one kilogram or 1000 cc) is of course one decimeter in length on every edge, whereas the cubic metron is 0.931-1/3 dm in length on every edge. And while the edge of a cubic decimeter is etched to indicate TEN equal subdivisions, the edge of a cubic metron is marked to indicate a DOZEN equal subdivisions.

The cubic metron is about 4/5 of the capacity, mass, or volume of one kilogram, liter, or cubic decimeter; and the cubic edometron is graphically shown to be more than twice as precise as one gram, milliliter, or cubic centimeter of the international metric system, being less than half in volume, mass, or capacity of the cubic centimeter.

One emimetron of length, decimally, equals about 89 (75;0) presently controlled (1960) krypton wavelengths. So it may be seen that one etrimikalk or one etrimijon is a rather minute cube of weight or volume. A much, much smaller weight scale is possible, and in preparation, to enable physicists to describe in precise terms which of two nearly equal halves of gatherings of a smashed atom is greater, in the dozenal system. That is, if you can isolate the gatherings.

TABLE OF DOREMIQUE DOZENAL SYSTEM ABBREVIATIONS

METRONIC VOLUME

NAME		SYMBOL	PRECISION
1 dómijon,	abb.	dmj *1*, or	j *10 000;0*
1 mijon,		mj *1*,	j *1 000;0*
1 réjon,		rl *1*,	j *100;0*
1 dojon,		dj *1*,	j *10;0*
1 jon,		j *1*,	j *1;0*
1 édojon,		edj *1*,	j *0;1*
1 eréjon,		erj *1*,	j *0;01*
1 émijon,		emj *1*,	j *0;001*
1 édomijon,		edmj *1*,	j *0;0001*

METRONIC MASS

NAME		SYMBOL	PRECISION
1 dómikalk,	abb.	dmk *1*, or	k *10 000;0*
1 mikalk,		mk *1*,	k *1 000;0*
1 rékalk,		rk *1*,	k *100;0*
1 dokalk,		dk *1*,	k *10;0*
1 kalk,		k *1*,	k *1;0*
1 édokalk,		edk *1*,	k *0;1*
1 érékalk,		erk *1*,	k *0;01*
1 émikalk,		emk *1*,	k *0;001*
1 édómikalk,		edmk *1*,	k *0;0001*

METRONIC DIMENSION

NAME		SYMBOL	PRECISION
1 dómimetron,	abb.	dmm *1*, or	m *10 000;0*
1 mimetron,		mm *1*,	m *1 000;0*
1 rémetron,		rm *1*,	m *100;0*
1 dometron,		dm *1*,	m *10;0*
1 metron,		m *1*,	m *1;0*
1 édometron,		edm *1*,	m *0;1*
1 érémetron,		erm *1*,	m *0;01*
1 émimetron,		emm *1*,	m *0;001*
1 édómimetron,		edmm *1*,	m *0;0001*

METRONIC ANGLE

NAME		SYMBOL	PRECISION
1 dóminaire,	abb.	dm∠ *1*, or	∠*10 000;0*
1 minaire,		m∠ *1*,	∠*1,000;0*
1 rénaire,		r∠ *1*,	∠*100;0*
1 donaire,		d∠ *1*,	∠*10;0*
1 naire,		∠ *1*,	∠*1;0*
1 édonaire,		ed∠ *1*,	∠*0;1*
1 érénaire,		er∠ *1*,	∠*0;01*
1 éminaire,		em∠ *1*,	∠*0;001*
1 édóminaire,		edm∠ *1*,	∠*0;0001*

METRONIC TIME

NAME	SYMBOL		PRECISION		AMERICAN SLANG	PRESENT
1 die, abbr.	d *1*,	or	d *1;0*,	also known as	1 day or dag	24 hours
1 édodie,	edd *1*,		d *0;1*,		1 watch or tour	2 hours
1 érédie,	erd *1*,		d *0;01*,		1 break or test	10 minutes
1 émidie,	emd *1*,		d *0;001*,		1 moment	50 seconds
1 édómidie,	edmd *1*,		d *0;0001*,		1 flash	4-1/6 sec.
1 érémidie,	ermd *1*,		d *0;00001*,		1 dot	25/72 sec.

NOTE: é pronounced as in café. ó takes accent, rather than the next to last syllable. Symbols, like the U.S. $1.00 sign, in metronic system precede the numeral---but follow in metric system, as 1 m or 1 kg. Die may be pronounced as Latin word or as common English word of dye or day or Danish dag---many a dot makes a day, 248 832 dots decimally. If the speed of light is equal to 186 216.192 international miles per second, this is decimally equal to 64 658.4 miles per dot or exactly 53 882.0 domimetrons per dot. Dozenally speaking the speed of light

may be shown tomorrow as equal to *27 222;0* domimetrons per dot, or dmm*27 222;0* per dot. Kalk, calc, calq, qualque, kalch, kalx, or xalk (about 0.80782 kg) is no more than a variant of Kalka'b, meaning stone cube. From Latin calx or calculus, stone. And Arabic ka'b, cube. The measurement of volume, one Jon (about 0.80782 liter), may be spelled and pronounced john, jeanne, gian, or jan, in the different tongues. Metron is from the Greek, "I measure" or "Let me measure." Clearly it is applying for work. One dometron is equal to 1.1176 m exactly. Naire is from the French, meaning one of class or group, such as millionaire or legionnaire, There are 20736 naires, decimally, in one assumed great circle of the earth, in any circle of three hundred sixty degrees, equal to one dominaire, shown ∠*10 000;0.* One naire angle is the equal of 62-1/2 seconds of angle of the present system exactly. Bagley metronic temperatures may be described in terms of naire in place of degrees. We have borrowed the Humphrey(;) dozenal point from the punctuation people to indicate digits of a dozenal base in the same manner a comma or period indicates a decimal fraction. It is used "to distinguish the conjunct members" of a sentence or of a dozenal number. The stems above have been shanghaied and pressed into service from all nations and from every people, there is nothing new in them, they are old as the hills, and we hope they may prove as durable as mountains. But even mountains can be moved. If you have a more fitting phrase or stem do not hesitate to bring it forth, for the field is wide open.