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

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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.

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All figures in italics are duodecimal.

DOUZE NOTRE DIX FUTUR

by Jean Essig

DOUZE: Notre Dix Futur (TWELVE: Our Future 'Ten'). By Jean Essig. Preface by Albert Caquot. Dunod, 92 rue Bonaparte (6^{e}), Paris, 1955. 170 pp.

The latest important addition to the international duodecimal movement is this clear, carefully documented book by M. Essig which appeared in France in 1955. M. Essig apparently became interested in duodecimals in the winter of 1939-1940 "on the Lorraine front" in the early days of World War II. He was encouraged to put his further thoughts into concrete form by the late Pierre Lecomte du Nouy, whose philosophical and scientific writings are known to a wide circle of American readers.

In his modest introduction the author states that "the purpose of this study--however revolutionary it may appear--is only to implant as widely as possible certain ideas which, once recognized, would facilitate for all men all the calculations they need to make."

He sets about this purpose straightforwardedly. Part I is devoted to "principles." After examining the Roman, Indo-Arabian, and other earlier number systems, together with the development of place-value, and prevailing unit systems (weights and measures), he makes the reasonable suggestion that numbers and unit systems should have the same base, and a better base for the former might be selected than the one we have.

Part II deals with "applications." He sets up the duodecimal system in customary form (he uses reversed 7--Ꮮ -- for Ӿ and reversed 2--Ƨ -- for Ɛ and distinguishes duodecimal from ordinary numerals by enclosing the former in typographic boxes) and goes carefully and clearly through the four fundamental operations, roots, and logarithms.

A separate chapter is devoted to fractions and divisibility, pointing out the superiority of duodecimals over decimals in expressing many small fractions as whole numbers, and its frequent advantage in obvious factorability. The circle and its divisions together with the hour take another chapter. M. Essig follows most other duodecimalians in accepting the *20* hour day. Because of the very small size of the duodecimal second, he introduces in circular division the *prime*, the *10*th part of the duodecimal minute.

His substantial section on The Units (weights, measures, etc.) cannot be presented adequately in a brief review. As a

Frenchman he naturally proceeds from the metric units, but is thoroughly familiar with the proposals made on this side of the Atlantic, and specifically cites the writings of Mr. George Terry, this reviewer, and the Duodecimal Society. His proposals are not radical; in the main they simply adapt metric units to duodecimal notation. For example, his fundamental unit of length would be the duodecimal kilometer set at the Earth's circumference divided by *10,000*. This brings the duodecimal meter to a value of 1.116 of the present meter. Volume derives from the duodecimal meter cubed, bringing the new liter to 0.805 present liters; this four-fifths "corresponds quite closely to the long accepted capacity of our bottles." For mass, the duodecimal ton would be *1000* kilograms. Units of speed, acceleration, and force are derived from these.

For temperature, M. Essig discusses the theoretical advantages of *100* degrees between freezing and boiling, but prefers the principle of least change here, and accepts the *84* (100) degrees of the present Centigrade scale. His great calorie is the amount of heat needed to raise 1 duodecimal kilogram of water from 0 to 1 degree. He has further proposals, including electrical units, but suggests that specialists, on the basis of his tentative suggestions, should set about the task of constructing a system of basic units related in size to the existing units, but adapted to the proposed new numeration.

In a concluding chapter M. Essig states that "To present the principles, to demonstrate the practicality, and to stimulate consideration in the widest possible circles and assure broad dissemination, such is--at present--our sole ambition." However, he is hopeful of further developments. Pointing out the drastic changes that did occur in France after 1789 and in Russia after 1918, he weighs the disadvantages to the generation that would be involved in a change in the number system against its advantages in a world where technology is vastly increasing in importance, discusses the newer methods of intercommunication among nations, and is obviously optimistic though not assured that change is possible.

His book is certainly a persuasive, effective tool for stirring up interest in France in this movement. On publication, it received a first-page notice in *Figaro*, one of the most important French publications. Various French technical organizations have expressed interest, and M. Essig is to conduct a conference on the subject at the University of Paris on 17 November.

DOUZE: Notre Dix Futur includes a good bibliography and an index. The Duodecimal Society has imported some copies, and these are available while they last at cost, which is $1.50, postage included.

F. Emerson Andrews

THE DOZENAL (DUODECIMAL) NUMBER SYSTEM

by O. R. Tucker

1. INTRODUCTION

Advocacy of "metric" as opposed to "inch" systems of measurement sometimes springs from wrongly associating with the base 10, the place method of giving a numerical symbol multiple or fractional values. More often, such advocacy springs from supposing that the present number system based on 10 is inviolable. This also is a mistake: our present Arabic system will probably in time give way to a system which uses the place method for changing the numerical value of a symbol, but which bases the system on the dozen instead of on 10. Change-overs to decimetric measures may therefore prove to have been the result of short-sighted policies.

2. HISTORICAL

The origin of the decimal system is the accident that homo sapiens has 10 fingers, though not all primitive peoples get to dealing with large numbers by ordering them in groups of 10.

The Roman number system was in force in Europe for some 2000 years, giving way to the Arabic system in the 10th century. The advantages of the Arabic system spring from the discovery of a symbol for none in enabling any large or fractional number to be denoted by the relative positions of nine "digits" and the symbol for none. (Note the respective periods of service of the Roman and Arabic systems).

The French government some 150 years ago decreed the use of the decimetric system for measures (excluding measures of time and of angles, because the decimal system does not fit in with the associated natural phenomena). Other governments followed the French lead with various reservations besides that relating to measurement of time and angles. In 1896, the British government also proposed to follow the French, but the intention was abandoned, partly because Herbert Spencer led an opposition using mathematical and philosophic arguments.

Now, Essig advocates revision of the French decimal system on the duodecimal base ("Douze Notre Dix Future", Jean Essig, pub. Dunod (1955), 92 Rue Bonaparte, Paris). The American Duodecimal Society exists to prepare the way for a similar change in the U.S.A.

3. DOZENAL NOTATION

1	2	3	4	5	6	7	8	9	X	Ɛ	10	100
One	two	three	four	five	six	seven	eight	nine	dek	el	do	gro

Do stands for dozen
Gro stands for gross
Names for larger powers of Do are available.

4. PLACE VALUE AND CONVERSION

265 2 gro + 6 do + 5 (= 2.65 gro or 26.5 do)

Decimal 365 to dozenal

```
12|365
12|30 + 5
    2 + 6
```

365 = 265

Dozenal to decimal

265 = 5 + 12 x 6 + 12 x 12 x 2
= 365

5. ADDING

136	5 ft. 9 in.	5.9 ft.
694	3 ft. 2 in.	3.2 ft.
3Ɛ2	2 ft. 8 in.	2.8 ft.
1000	Ɛ ft. 7 in.	Ɛ.7 ft.

Force of habit makes it difficult at first to count up to do before carrying, but it is a fairly easily changeable habit.

6. MULTIPLICATION

	2	3	4	5	6	7	8	9	X	Ɛ	10
2	4	6	8	X	10	12	14	16	18	1X	20
3	6	9	10	13	16	19	20	23	26	29	30
4	8	10	14	18	20	24	28	30	34	38	40
5	X	13	18	21	26	2Ɛ	34	39	42	47	50
6	10	16	20	26	30	36	40	46	50	56	60
7	12	19	24	2Ɛ	36	41	48	53	5X	65	70
8	14	20	28	34	40	48	54	60	68	74	80
9	16	23	30	39	46	53	60	69	76	83	90
X	18	26	34	42	50	5X	68	76	84	92	X0
Ɛ	1X	29	38	47	56	65	74	83	92	X1	Ɛ0
10	20	30	40	50	60	70	80	90	X0	Ɛ0	100

A few hundred years ago, citizens did not memorize the decimal multiplication table but carried it around with them on paper. A government standardizing the dozenal system would

probably provide this facility. The dozenal table is easier to memorize than the decimal because it is more regular - see Cols. 3, 4, 8 and 9.

```
Eq. 365 = 3 x X x X + 6 x X + 5
        = 3 x 84    + 50    + 5
        = 210       + 50    + 5
        = 265
```

7. ADVANTAGES OF THE DOZENAL SYSTEM

I am not competent to discuss the advantages of the dozenal system. The Duodecimal Society of America affirms that the potential benefits, both in everyday life and for mathematics and science, are very great and that general use of the dozen base would lead to discoveries in theory of numbers and in the higher branches of mathematics (because a more rational number system would provide a better tool than the one in use and would promote those leaps of imagination into the unknown which originate discoveries). The advantages spring from the fact that 3 and 4 are factors of 10 but not of 10. Following are hints of the sort of advantage:

(a) Time and angle measurements have not been decimalised because the decimal base does not suit the number of solstices and equinoxes, the phases of the moon, the seasons, the number of moons to the solar year, the simple divisions of the circle into thirds, quarters, sixths and twelfths, and the mariners' compass.

(b) Compare the place system in the two notations for denoting commonly occurring fractions of pi:

	2pi/3	pi/2	pi/3	pi/4	pi/6	pi/12
Decimal	.666..pi	.5pi	.333..pi	.25pi	.1666..pi	.08333..pi
Dozenal	.8pi	.6pi	.4pi	.3pi	.2pi	.1pi

(c) Merchants did not choose the dozen and the gross as package units arbitrarily, but for economic packing. The dozenal system would simplify all packaging and invoicing arithmetic.

(d) 33-1/3% and 66-2/3% are a nuisance in the decimal notation because they become 33.333..% and 66.666..%. In dozenal notation these become 40% and 80%. (The pre-Spencer Prime Minister who was irritated by "those damned dots" had a good case, but it lay against the base 10 and not against the dot).

(e) All arithmetic involved in 3-shift working (probably a permanent feature of industry, even as weekly hours of work decrease) will be simpler on dozenal than on decimal notation.

(f) Calculating machines generally work on the binary scale, but the dozenal scale is preferable to the decimal scale from the point of view of their designers and users with regard to the preparation of material to feed to the machines and to the production of their output in convenient form. Similarly (probably as regards control apparatus involving cyclic operations.

(g) Quick and accurate reading of instrument scales is a subject of increasing importance. Scale units divided into 10 sub-units, with or without a heavy half-way line, are not good from this point of view. The hour marking on a clock and the inch-to-a-foot marking on a draughtsman's scale are good. (There may be a psychologic connection with division into right, left and centre and of landscapes into foreground, middle-distance and background).

Against the above advantages, the objections to a change-over are:

(i) getting everyone to forget the old and to use a new multiplication table and to acquire the habit of counting to a dozen before carrying;

(ii) altering measures;

(iii) altering the dates in history books in use and learning to deal with obsolete numbers in the decimal form (as we deal with Roman dates on monuments).

Except for the diversity of people involved and objections to gradualness, these objections are not deterrent to a change-over. To a large coherent company working in isolation from other communities, the difficulties would present themselves as re-tooling problems to be overcome. But events seem to be forcing homo sapiens into a coherent community, and the time for rationalising our number system may come much sooner than Spencer expected.

8. DO-METRICS (Duodecimal Society of America)

(Memo: *10* stands for a dozen; *100* for a dozen dozens; *1000* stands for a dozen dozen dozens.)

Linear	Mechanics Scale	Basic Scale
	10 points = *1* line	*10* karls = *1* quan
	10 lines = *1* inch	*10* quans = *1* palm
	10 inches = *1* foot	*10* palms = *1* yard
		1000 yards = *1* mile

Weight		Volumes
	10 carats = *1* gram	
	10 grams = *1* ounce	
	10 ounces = *1* pound	(*1* palm)^3 = *1* dometric pint
		(*3* in.)^3 = *1* dometric lb. of water which is 2½% less than 1 lb. avoirdupois.

Liquid	
	10 dribs = *1* dram
	10 drams = *1* founce (fl.oz.)
	10 founces = *1* pint.

Temperature — 100° between freezing and boiling point of water.

Time and angles — A single measure based on successive dozenal divisions of day and circle.

9. CONCLUSIONS

(a) Traditional systems of measurement using the factors 2, 3 and 4 are based on a profounder and more satisfying logic than decimetric measures.

(b) Rationalising of measures internationally should await rationalising of the number system in use by changing from the decimal to the dozenal base.

(c) Users of ABC+ (etc). measures should not merely defend these measures on grounds of established usage, but should also advertise the fundamental defects of the decimal system.

(d) For the present, in international work, the current practice of compromising between the two systems and the publication of parallel tables of dimensions should continue.

O. R. TUCKER

Coventry, England

+ America-Britain-Canada

HENRY MARTYN PARKHURST

by Ralph H. Beard

One of the most devoted of our duodecimal pioneers was Henry Martyn Parkhurst, who published in 1889 a table of duodecimal logarithms for the numbers from 1 to 143 to 26 places, and for the numbers from 101 to 2159 to 12 places.

He became the first American phonographic reporter, and made this his profession. For six years, (1848-54) he was Chief Official Reporter for the United States Senate, and reported the famed speeches of Clay, Calhoun and Daniel Webster. For twenty years he was official reporter for the Superior Court in New York City, having his offices at 25 Chambers St. He was the first to introduce women to the profession of stenography, - using a modification of the system of Isaac Pitman, (who was also a duodecimal pioneer.)

For forty years he published The Plowshare, a magazine devoted to alphabetic reform. He wrote two books, The Stenophonographer, (1870), and An Introduction to Stenophonography (1889). He published two other magazines, The American Reporter, and The Complete Phonographer, which were later combined with The Plowshare. All the work of writing these texts, setting the type from the special fonts that he used, and printing them, were the work of his own hands. And these were only his professional activities.

He invented a universal language, he devised a new musical notation, he invented and constructed an "Harmonic Organ", he patented a new form of proportional dividers, he wrote papers on "A New Currency", and "A New Mode of Minority Representation". These might be considered his collateral interests, for his major avocation was astronomy.

John Adelbert Parkhurst of Yerkes Observatory published a biographical sketch of Henry Martyn Parkhurst in Popular Astronomy #154, 1908, from which much of the data for this paper was lifted. He states that the amount of solid and useful work accomplished by this amateur would be a credit to any professional astronomer. These two men never met, but from a correspondence extending over fourteen years, he placed Henry Martyn Parkhurst in the front rank of workers in stellar photometry.

From the pages of The Plowshare, we have abstracted the duodecimal papers and tables of this amazing pioneer and innovator, which follow. Henry Martyn Parkhurst was born in New Hampshire in 1825, and died, after a brief illness, at the age of 82, in his home at 173 Gates Ave., Brooklyn.

We wish to express our gratitude to the New York Public Library for the scholarly research and cordial collaboration extended to us.

DUODESIMAL LOGARITMS.

It iz wɛl non ɖat ɖɛ desimal scal orijinated wiɖ ɖɛ number ov ɖɛ fiŋgerz. Ɖɛ best scal for matimatical purposez iz ɖɛ duodesimal scal. I du not mɛn tu asert ɖat ɖɛ dijits wer not mad tu cɜnt wiɖ. On ɖɛ contrari, it iz mor naçural tu cɜnt ɖɛ moʃun in opniŋ ɖɛ hand az wel az in ʃutiŋ ɖɛ fiŋgerz. Stranj az it ma az it ma sɛm, it wil not materiali interfɛr wid ɖɛ old sistem tu adopt ɖɛ nu. It wud bɛ nesesari tu ad tu figurz for ten and ɛlevn, for hwiç i wud recomend x and ʌ. Ɖɛ familyar namz ov duzn and gros wud provid for ɖɛ comun numbɘrz, and it wud bɛ ɛzi tu invent namz for ɖɛ hir numberz. A duzn gros ma bɛ cold a murion, for ɛgzampl, and ɖen wɛ ʃud hav ɖɛ burion, trurion, ets. It wud produs no confuʒun tu lern ɖat 6 timz 9 ar fifti-for, or for duzn sics. Ɖɛ foloiŋ tabl ov logaritmz iz bast on ɖɛ nu scal, n bɛiŋ yuzd for x. Wɛ hop it ma bɛ yusful at sum tim, if ov no furder yus at prezent ɖan tu col atenʃun tu ɖɛ sub-ov a fundamental aritmetical rɛform.

	0	1	2	3	4	5
1	0000	0477	08ʌ2	10ʌ1	1482	1821
2	3420	3664	3897	3nʌʌ	4113	4318
3	537ʌ	552ʌ	5695	5836	5993	5ʌ25
4	6841	6964	6n84	6ʌn0	70ʌ8	720ʌ
5	7932	7n28	7ʌ20	8011	101	1n9

	6	7	8	9	n	ʌ
1	1ʌ5ʌ	2275	2572	2851	2ʌ15	3184
2	4512	4700	48n1	4n75	5041	5204
3	6071	61ʌ6	6335	6471	65n4	6715
4	731ʌ	7427	7533	7634	7738	7836
5	8295	37ʌ	462	543	624	703
0	7n0	9492	n061	n73ʌ	ʌ152	ʌ6ʌ5

DUODECIMAL NOTATION

by Henry Martyn Parkhurst

Something more is needed than invention, or unusual conviction of the importance of the invention, before it can be adopted. The machine must be constructed. If the railroad system of the world were suddenly destroyed, with everything used specially in connection with it, it would be a long time before we would be able to renew it. The rails must be made before they can be laid. The manufactories must be built before the rails can be made; and I will not venture to enumerate the work that must be done before the manufactories could be built and equipped. Yet the mass of the people having been educated to the knowledge of what is required, and there being no doubt of the utility, the work would proceed rapidly.

Far otherwise is it with a new invention not yet reduced to practice. All its preliminary work must be done, and nobody knows how to do it. The pioneer feels the way, by long labor and much experimenting, and educates others, until at last all is accomplished.

The phonetic reform has waited for all this preliminary work. Although nearly a generation has passed since I commenced The Plowshare, and much more since the first phonotypes were made, there is not yet in existence (1874) one complete font of type adapted to represent the pronounciation of the English language. Isaac Pitman still uses a different vowel scale, and I am still compelled to use makeshifts in italic because the proper matrices have not yet been made.

Metrological reform has long been pressed forward, and there are yet comparatively few who understand it, and fewer still who cannot more conveniently use the old weights and measures. But there is a special difficulty here, that the reform is not sufficiently radical, and that in the form in which it is pressed, it sweeps away all the benefits of the old divisions into 3, 6, and 12, the dozen and the gross.

The practical importance of the duodecimal reform is illustrated by the fact that the advantages of conforming to the base of the notation have not been sufficient to cause the substitution of 10's for 12's even in this country, where for a century we have had a decimal currency. In almost all cases, articles of merchandise are sold by the dozen and the gross. One reason for this is the facility of packing. 10 inch cubes will occupy a space 5 x 2 x 1. 12 inc cubes will occupy a space 3 x 2 x 2. The former will require 34 inches of enclosing surface, while the latter will enclose 1/5 more with but 32 inches of enclosing surface. To pack 10 of these 10's we require a box 5 x 5 x 4 and to pack 12 of the 12's a box 6 x 6 x 4, making no material difference between the two. But proceeding another step, to pack 10 of these 100's we require a box 20 x 10 x 5, and for 12 of the others 12 x 12 x 12. So for goods of other forms, will these 12's allow at every step an approximation to the cubic form of least enclosing material, the 10's at each alternate step, at least, must take a form considerably elongated.

Counting by 2's, 3's, 4's or 6's will be as easy and mechanical as counting by 2's or 5's now is, completing the cycle with the dozen.

The mathematical advantages of the duodecimal notation may be illustrated by a few statements. All numbers in 0, 2, 4, 6, Ӿ, are divisible by 2. All ending in 0, 3, 6, 9, are divisible by 3. All ending 0, 4, 8, are divisible by 4. All ending in 0, 6, are divisible by 6. If the last two figures are divisible by 8 or 9, so is the whole number. The multiplication table is therefore much simplified.

Another illustration is the formation of the table of squares, which require no computation, the last figures being 1, 4, 9, 4, 1, 0, etc., and the preceding difference being constant except that it increases by 1 at every 6th number; that is, next following each terminal 9.

A geometrical illustration is found in the important fact that the radius of a circle is exactly equal to the cord of 1/6 the circumference, and consequently the natural sin of 1/12 the circumference is precisely one half the radius.

An astronomical illustration is found in the fact that the moon revolves around the earth in so nearly 1/12 of a year. Dividing the year into 12 months, the suns apparent motion in one month is 1/12 of a complete circle. A corresponding diurnal motion divides the day into 12 hours.

In weighing, (and the same principle applies to the denomination of money used in making change), a series of weights composed of 1 and successive powers of 2, will weigh any amount by simple addition; and a series of 1 and the successive powers of 3, will weigh any amount by addition and subtraction. A series of 1, 2, 6, and 1, 2, 6 dozen, etc., is a mean between the two, adapted to the new notation.

The Duodecimal Metrical System

The advantages of the metrical system are great but they arise altogether from the correspondence between the base of the system and the base of the notation. The adoption of any metrical system will be a very much greater and a very much more radical change than the adoption of phonotypy. All of our knowledge of weights, measures and distances will require to be replaced by new values. Before making such a sweeping change it would be well to reform our notation, and then to prepare a metrical system in conformity with the new notation.

In The Plowshare for October 1851, I called attention to the duodecimal notation, which I asserted to be the best possible scale for mathematical purposes. I do not propose to argue the advisability of adopting that scale. But assuming that it is to be adopted, it will entirely overturn the old metrical system; and I propose to investigate the proper basis for a new duodecimal metrical system.

I consider it unwise to adopt as a basis an unknown, indefinite, or varying quantity. For all these reasons, a meter founded on the French system seems to me objectionable.

But the mean sidereal day is a unit of time, varying so slowly and so slightly, if at all, that its value for the year 2000 will practically be its value for thousands of years. The length of a pendulum making *100 000* vibrations per day at the equator, at the level of the sea, in vacuum, and at the temperature of melting ice, will give us a standard, easily ascertained with any desired degree of precision, and requiring no change from any possible advance in the sciences or arts.

The length of the new standard is about 4.692 inches. Its cube, the new standard of capacity, is about 1.788 quarts. This volume of distilled water, weighing 3.727 pounds avoirdupois is the standard of weight. This pound of fine gold will be the standard of value and the currency. All the standards have the same units.

The adoption of the new system would not compulsorily displace the old with regard to already determined quantities, such as land surveys. The new coinage and its benefits ought to be sufficient to insure its introduction.

The persistent refusal by the people to adopt the decimal metrical system arose from the fact that for every bisection it became necessary to divide by 5. The duodecimal system

for 2 bisections requires a division by 3, but this is rather an advantage than otherwise, as is manifest by the widespread adoption of the dozen and the gross, notwithstanding its incongruity with the received notation.

(Footnote: The foregoing is an abridgement and collation of material in a number of issues of The Plowshare, and a transliteration from the author's phonetic and phonotypic form. The following logarithmic tables are extracted from a section on duodecimal tables in the last issue of The Plowshare, #119, August 1889. As stated in the specimen page reproduced from The Plowshare, he uses Λ for Ɛ.)

DUODECIMAL TABLES.

BY HENRY M. PARKHURST.

TABLE 1.—Logarithms to 20 Dwecimals.

1	0000 0000 0000 0000 0000 0000 00	41	6964 4758 9993 583Λ 7191 2572 28	81	Χ112 Λ5Λ3 Λ12Λ 272Χ 7783 9347 38
2	3420 1Λ20 Χ37Λ Χ7Χ2 3204 520Χ 69	42	6Χ84 Λ804 04Χ8 7177 Χ655 4Λ23 66	82	Χ184 6679 8145 4421 Χ395 7780 96
3	537Λ 817Χ 8498 2837 57Λ3 17Χ2 Χ5	43	6ΛΧ2 279Χ 55Λ2 6228 Χ616 6692 52	83	Χ235 3229 32ΛΧ 71Χ2 2146 8741 1Λ
4	6840 3Χ41 8723 9384 6408 Χ419 17	44	7018 3164 Χ17Λ 4755 61Χ6 4327 02	84	Χ2Χ5 1724 Χ85Χ 595Χ 1859 Χ132 13
5	7032 4Χ51 7079 42Χ8 9826 5Χ68 5Χ	45	720Λ 2692 3557 ΧΛ52 6698 0776 37	85	Χ354 1ΛΛΛ ΧΛ43 0823 5609 5632 86
6	879Λ Χ09Λ 184Χ 1419 89Λ7 69Λ1 53	46	731Λ 2417 8602 6890 81Χ1 Χ177 21	86	Χ402 46ΛΛ 3964 4Χ0Λ 181Χ Λ8Χ1 00
7	9492 238Χ 4ΧΧ7 8Χ1Λ 96Χ6 7297 14	47	7428 3942 3603 6018 0586 Λ223 ΧΛ	87	Χ46Λ 965Χ 1395 25Χ7 1747 Λ020 8Λ
8	Χ060 5962 6Χ95 7Λ66 9611 3627 81	48	7532 8130 Λ981 4986 70Λ7 Χ902 98	88	Χ518 5085 8531 3337 93ΧΧ 9535 6Λ
9	Χ73Λ 4318 6974 5472 Λ3Χ6 3385 8Λ	49	7636 45Λ1 18ΛΧ 1959 948Λ 5678 77	89	Χ584 839Χ 3441 3944 0Λ04 2926 58
Χ	Λ152 6972 542Λ 2Λ8Λ 0Χ2Χ Λ077 08	4Χ	7737 6082 5592 5351 232Λ 6Λ92 10	8Χ	Χ62Λ 45Λ3 1909 9734 98Χ0 5984 Χ4
Λ	Λ6Λ5 ΧΧΛ0 8546 192Λ 2960 5377 50	4Λ	7836 1Χ22 1839 5374 8042 ΛΧ6Λ 6Λ	8Λ	Χ695 8913 0915 2045 26Λ2 1Χ99 8Λ
11	0477 Λ323 1657 7390 Λ999 5Λ09 Χ7	51	7Χ28 40Χ0 50Λ2 2098 9532 0783 Λ7	91	Χ7Χ4 325Χ 3294 0716 Χ120 72Λ0 01
12	08Λ2 42ΧΛ 3259 7602 08ΧΛ 04Χ5 81	52	7Λ20 0432 1099 8Λ46 609Λ 4Λ91 56	92	Χ848 5863 1975 47ΛΧ 378Λ 4432 58
13	10Λ2 100Λ Χ555 6Λ24 3419 764Λ 44	53	8011 6706 Λ360 2292 8Χ90 Χ660 Χ3	93	Χ8ΧΛ ΛΛ2Χ 9Λ88 Λ272 5250 84Λ4 Λ6
14	1480 7833 5247 6749 0815 8836 31	54	8100 Λ705 196Λ 3Λ11 7022 7053 48	94	Χ952 Χ051 Χ133 3568 Χ300 3Λ11 45
15	1822 6620 2116 35Λ1 4Χ23 4ΧΧΛ 69	55	81ΧΧ 4174 8714 Λ679 9603 Λ976 45	95	Χ9Λ5 0199 Λ53Λ 0134 5635 41Λ8 64
16	1Λ5Λ 6259 5126 4055 25ΧΧ 8534 38	56	8295 8Λ8Λ Χ194 3148 Λ758 0168 Χ3	96	ΧΧ56 6512 0070 0510 0693 Χ887 25
17	2276 8432 Χ421 Λ122 3898 3Χ95 92	57	837Λ 29ΛΧ 6039 50Χ3 0804 1ΛΛ8 25	97	ΧΧΛ7 4ΛΧΧ Λ668 9719 2293 5Λ4Λ 66
18	2572 8393 37Χ1 1671 4033 4285 75	58	8462 Χ461 Χ83Χ 0975 Λ230 3308 84	98	ΧΛ57 7ΛΧ3 3914 3Λ33 5534 01Χ0 7Χ
19	2351 Χ548 8383 Λ657 3299 8Χ79 Λ9	59	8544 8317 7Χ87 8067 9260 1885 Λ1	99	ΧΛΛ7 365Λ 8410 0843 Λ183 9293 76
1Χ	2Λ16 0Χ11 68Λ8 0511 5Λ64 Χ585 ΛΧ	5Χ	8624 9140 Χ316 Λ8ΧΧ Χ515 6352 20	9Χ	Λ056 3942 ΛΛΧΛ 3Λ56 Λ247 507Χ 18
1Λ	3185 0159 45ΧΛ 5Λ30 4669 00Χ3 08	5Λ	8703 1634 84ΧΧ 554Χ 882Λ 3805 33	9Λ	Λ0Λ4 89ΧΧ 7002 0411 250Χ 0186 81
21	3564 93Χ3 2135 8595 7450 Λ914 Λ8	61	8876 Λ367 2Χ97 8354 85Χ7 ΧΛΧ8 3Λ	Χ1	Λ1ΧΛ 99Χ1 4Χ90 365Χ 5700 Χ732 Χ1
22	3898 1243 ΛΧ09 5Λ73 2ΛΧ1 Λ118 54	62	8950 5891 4Χ62 7219 2861 ΛΛ20 6Χ	Χ2	Λ248 6001 3464 087Λ 0736 5992 64
23	3ΧΛΛ 04Λ6 Χ250 80ΧΧ 4Λ99 4Λ68 74	63	8Χ24 5Χ61 5612 Λ211 1044 14Λ7 Χ2	Χ3	Λ2Χ4 7553 04Λ5 Λ4ΧΛ 248Χ Χ360 73
24	4112 6210 160Λ 61Χ4 3ΧΛ3 56Λ4 2Λ	64	8ΧΛ7 0274 6Λ45 84Χ6 Χ0Χ5 22Λ2 Χ9	Χ4	Λ340 2852 Λ44Λ 7728 92Χ3 Χ1Χ0 04
25	4317 4161 7220 676Χ Λ127 1983 63	65	8Λ88 127Λ 1431 Χ74Λ 0447 0652 64	Χ5	Λ397 2734 91Λ4 0882 5077 5781 56
26	4512 2Λ30 8907 5706 6622 0859 Λ1	66	9057 9402 32Χ5 87ΧΧ 8795 08ΛΛ 3Χ	Χ6	Λ431 8627 Χ012 0Χ75 0095 386Λ 50
27	46ΛΛ Χ511 2927 Χ364 2Χ96 Λ982 Χ9	67	9126 0ΛΧ1 85Λ5 61Λ1 1748 2798 31	Χ7	Λ487 8157 30Λ0 5Χ13 49Χ9 8416 13
28	48Χ0 97Χ4 35Λ9 532Λ 3Χ1Χ 1Χ44 9Λ	68	91Λ3 0715 0304 ΧΧ35 Χ440 26Χ2 90	Χ8	Λ521 1626 0121 26Λ3 Χ227 0201 Λ5
29	4Χ75 706Χ ΛΧ22 4566 8553 6Λ5Χ 36	69	927Χ 8675 1728 Χ925 Χ790 674Λ 59	Χ9	Λ576 0973 0Χ98 8970 Χ293 466Χ Λ0
2Χ	5042 8541 0488 2193 8027 Χ0ΛΧ 16	6Χ	9345 12Λ5 738Λ 7455 ΛΛΧ0 1988 37	ΧΧ	Λ60Χ 6095 6Χ86 Χ260 0808 4Λ84 Λ3
2Λ	5204 721Λ ΛΛ65 1108 7311 1143 72	6Λ	940Χ 3069 Χ6Λ6 Χ475 5921 787Χ 14	ΧΛ	Λ662 54Χ4 Χ595 6284 1915 1839 0Λ
31	5530 3970 66Λ0 8636 Λ659 6912 01	71	9554 Λ471 9193 789Χ 1649 Χ958 07	Λ1	Λ748 Χ801 3309 7Λ42 1382 Λ170 Χ6
32	5696 Χ353 8793 9004 6ΧΛ0 90Χ4 3Λ	72	9616 6715 7972 4917 78Χ4 8096 74	Λ2	Λ79Λ 491Λ 49ΧΛ 3885 3Χ08 7206 92
33	5837 74Χ1 4Λ33 Χ008 5590 76Λ0 90	73	9697 031Λ Χ6Λ8 93Χ6 491Χ 3566 48	Λ3	Λ831 5348 530Χ 6397 2803 6ΧΧ5 12
34	5992 Χ7Λ4 1Λ53 0253 7237 9494 22	74	9756 4853 341Λ 9896 0371 89Χ3 14	Λ4	Λ883 0382 8ΛΛΛ Λ558 2434 8517 31
35	5Λ24 Λ394 9019 8873 8897 8779 8Χ	75	9814 8264 647Χ 2Λ49 5312 3993 ΛΛ	Λ5	Λ914 1Λ01 4Λ77 6852 Χ556 6527 38
36	6072 0469 6735 Χ239 64Χ2 2088 67	76	9891 Λ0ΧΛ 01Χ3 8342 0215 2440 96	Λ6	Λ964 Χ238 6239 684Χ 1464 6Χ94 5Λ
37	61Λ6 47Λ4 9600 6135 46Χ0 2Χ88 07	77	994Χ 16Λ1 6543 41Λ0 9484 11Χ4 ΛΛ	Λ7	Λ9Λ5 1261 236Χ 9497 0816 6371 ΧΧ
38	6336 2932 5069 Λ0Λ3 9169 3794 67	78	9Χ05 3Λ9Λ 1113 27Λ4 ΧΧ75 Λ500 23	Λ8	ΛΧ44 Λ061 8688 Χ491 1719 Λ560 89
39	6471 918Χ ΛΧ31 975Λ 9010 9232 29	79	9Χ7Λ 668Λ 6204 0Λ9Λ 868Χ 1565 92	Λ9	ΛΧ94 3925 6Χ64 6914 6680 Χ80Λ Λ9
3Χ	65Χ5 207Χ 2961 4012 7871 52Λ1 75	7Χ	9Λ34 9688 193Χ 287Λ 4092 2237 81	ΛΧ	ΛΛ23 3555 6860 4130 ΛΧ33 8Χ13 Χ0
3Λ	6714 7767 3588 4099 0Χ89 9029 14	7Λ	9ΛΧ9 1284 549Λ 340Λ 1502 9942 30	ΛΛ	ΛΛ71 Χ213 9ΛΧ1 9100 2739 Λ285 37

TABLE 5.—Logarithms to 10 Dwecimals.

101	0049 8AA3 229X	141	14A7 AA04 X269	181	25X1 512X 5046
102	0097 1288 124X	142	1533 1514 94X1	182	260A A902 3242
103	0124 0917 1270	143	155X 0832 AAA1	183	263X 4833 5005
104	0170 77A2 3214	144	15X4 859X 61A7	184	2668 7A22 1816
105	01A8 9AX5 5364	145	161A 2111 8586	185	2696 95XX 4X51
106	0244 7982 3985	146	1635 514X 1670	186	2704 9473 X868
107	0290 1210 5817	147	168A 5708 8890	187	2732 7755 AX7X
108	0317 2195 52A8	148	1705 3645 9010	188	2760 4273 9802
109	0361 X958 8X8A	149	173X XA78 9516	189	2789 A228 1A93
10X	03X8 319A A7X4	14X	1774 3A20 92A5	18X	27A7 4655 7566
10A	0432 3362 99X5	14A	17X9 6530 0103	18A	2824 8356 5605
111	0501 3158 A438	151	1857 4226 4097	191	287X A04X 0A36
112	0546 2A02 6967	152	188A A57X A747	192	28X7 X078 1462
113	058X X850 6X34	153	1904 4495 A364	193	2914 7630 0670
114	0613 2635 X677	154	1938 6AX6 68X3	194	2941 8546 X493
115	0657 2527 9497	155	1970 7323 6968	195	2969 9X21 3A01
116	069X X595 AX9A	156	19X4 52AA 17A3	196	2996 2893 A24A
117	0722 286X 8025	157	1X18 0A66 XAA5	197	2X02 613X A598
118	0765 3216 5742	158	1X4A 6514 0080	198	2X2X 7AA6 5239
119	07X7 AA00 6XX0	159	1X82 97A2 A987	199	2X56 849X 1A95
11X	082X 4A8X 8X69	15X	1XA5 X833 A087	19X	2X82 7405 8947
11A	0870 64X5 3884	15A	1A28 9646 467X	19A	2XXX 4990 5X07
121	0933 X646 30A3	161	1A92 089A 7814	1X1	2A41 7523 X615
122	0975 1392 7546	162	2004 517A 1646	1X2	2A69 0722 1680
123	09A6 076A 5196	163	2036 7525 6374	1X3	2A94 4422 9956
124	0X36 8636 6124	164	2068 7784 0127	1X4	2AAA 6840 2761
125	0X77 1048 5784	165	209X 5943 3772	1X5	3026 7790 5047
126	0XA7 2240 8X6A	166	2110 1X4A 833A	1X6	3051 7269 3680
127	0A37 0071 7022	167	2141 7A11 0237	1X7	3078 54X8 644A
128	0A76 6774 1792	168	2172 AA72 84X5	1X8	30X3 22X3 7362
129	0AA5 9AX0 5116	169	21X4 201A 8XXA	1X9	3109 986A 9X20
12X	1034 X185 4830	16X	2215 20AX 88A1	1XX	3134 3X22 8329
12A	1073 7178 A096	16A	2216 0235 X109	1XA	315X 8793 X681
131	1130 3952 0A37	171	22X7 2717 2298	1A1	31XA 234A 382X
132	116X 3612 48A5	172	2317 6A0A 9X1A	1A2	3215 3182 0721
133	11X8 025X 858X	173	2347 9489 490X	1A3	323A 2849 96X0
134	1225 5XAA A485	174	2377 9A04 20A6	1A4	3265 0A82 6X3A
135	1262 8802 176X	175	23X7 8750 0589	1A5	328X 9A78 2808
136	129A 85A0 4576	176	2417 5580 6782	1A6	32A4 5846 5216
137	1318 5510 X660	177	2417 05A8 X646	1A7	331X 0200 867X
138	1354 A5X9 00A0	178	2476 5863 X351	1A8	3343 5476 5012
139	1391 2585 3138	179	24X5 915A AX92	1A9	3368 9442 8978
13X	1409 31X5 3851	17X	2514 X90A 5374	1AX	3392 0134 8354
13A	1445 0990 01X1	17A	2543 X754 0618	1AA	33A7 1763 1A05

TABLE 5. Logarithms to 10 Dwecimals.

201	3445 1040 4231	241	4138 3913 5337	281	48AX 6110 84XA
202	3469 XA14 0650	242	4154 0567 1465	282	4918 1X25 861A
203	3492 7772 2607	243	4174 8358 1X17	283	4935 8A31 4375
204	34A7 31X8 A5AA	244	4195 32A3 58A7	284	4953 3435 7853
205	351A 9612 3229	245	41A5 9401 A272	285	4970 9140 6114
206	3544 2837 A622	246	4216 2690 3548	286	498X 2253 X363
207	3568 6873 88A7	247	4236 6A27 287A	287	49X7 6779 6706
208	3590 9713 1586	248	4256 X557 4496	288	4X04 X4AA 4869
209	35A4 A3X7 6797	249	4277 1169 2A45	289	4X22 1663 1X72
20X	3618 AA06 3716	24X	4297 2A69 3A36	28X	4X3A 4032 6938
20A	3640 A480 6047	24A	42A7 3A64 00A1	28A	4X58 5X33 3673
211	3688 6A83 24X8	251	4337 356X 427X	291	4X92 7727 2973
212	36A0 3131 3A89	252	4357 1A92 5394	292	4XXA 7629 7042
213	3713 X17X 241A	253	4376 A819 A8X8	293	4A08 697A 67X6
214	3737 40A6 3669	254	4396 8694 AA44	294	4A25 5566 7382
215	375X 8A32 0170	255	43A6 4787 5686	295	4A42 35A0 2146
216	3782 0879 7241	256	4415 AA01 3488	296	4A5A 0X99 7888
217	37X5 3525 2484	257	4435 6486 3568	297	4A77 9834 4383
218	3808 5100 9A56	258	4455 00X6 2AX2	298	4A94 5X41 7667
219	382A 5818 4871	259	4474 4A68 X49X	299	4AA1 1506 87X6
21X	3852 5283 8157	25X	4493 9099 9448	29X	5009 8450 847X
21A	3875 388X 4305	25A	44A3 0484 6932	29A	5026 2861 3037
221	38AX 9778 0343	261	4531 4865 8844	2X1	505A 16A5 3X49
222	3921 5079 97XX	262	4550 5872 A2X9	2X2	5077 6147 2449
223	3943 A558 691X	263	456A 5A5A 8369	2X3	5093 X07A 8454
224	3966 4X23 5119	264	458X 5533 3067	2X4	50A0 149A 9XA9
225	3988 92X5 4X92	265	45X9 41A8 9A55	2X5	5108 41A0 6725
226	39XA 0771 51X6	266	4608 217A 6940	2X6	5124 63A6 9716
227	3X11 3052 3767	267	4626 A446 66X2	2X7	5140 7XAA 5774
228	3X33 4556 8X29	268	4645 7X20 9837	2X8	5158 8A07 5055
229	3X55 4X91 41A1	269	4664 3711 3992	2X9	5174 941A 5847
22X	3X77 4448 7849	26X	4682 X722 AA20	2XX	5190 9244 511X
22A	3X99 2X53 0538	26A	46X1 4X60 8444	2XA	51X8 8583 033X
231	3A20 9006 3792	271	471X 32AA 418A	2A1	5220 53X0 0414
232	3A42 478A 6397	272	4738 7431 8X12	2A2	5238 2X87 9367
233	3A63 A418 6770	273	4756 X8A3 0690	2A3	5253 AXX3 X341
234	3A85 5187 3XA3	274	4775 1509 X462	2A4	526A 8434 X432
235	3AX6 9A35 8474	275	4793 3484 8878	2A5	5287 4303 4251
236	4008 1X21 5252	276	47A1 47X6 14XX	2A6	52X2 A713 X139
237	4029 4X04 2556	277	480A 5278 5782	2A7	52AX 646X 9A9X
238	404X 6XXA 721A	278	4829 5106 2003	2A8	5316 0754 9439
239	406A 80X9 1465	279	4847 4315 6589	2A9	5331 6392 147X
23X	4090 8406 2036	27X	4865 28A0 X552	2AX	5348 A567 2X30
23A	40A1 7850 10A7	27A	4883 065X 4882	2AA	5364 40X0 6211

TABLE 5.—Logarithms to 10 Dwecimals.

301	5396 Ɛ804 X282	341	59X8 3093 8148	381	634X 02Ɛ6 8Ɛ0Ɛ
302	53Ɛ2 2800 5Ɛ85	342	5X01 704Ɛ 33Ɛ8	382	6361 9444 8987
303	5409 5171 5776	343	5X16 X6X6 0973	383	6375 615X 85Ɛ2
304	5424 709Ɛ Ɛ9Ɛ8	344	5X30 1823 15Ɛ4	384	6389 2642 ƐX31
305	543Ɛ 8590 2X11	345	5X45 4445 61X9	385	63X0 X6Ɛ7 X675
306	5456 9446 4726	346	5X5X 6754 3377	386	63Ɛ4 6318 8108
307	5471 988X 6852	347	5X73 8552 5278	387	6408 1764 7903
308	5488 96X4 X499	348	5X88 9X42 ƐƐ88	388	641Ɛ 8761 0Ɛ13
309	54X3 8X95 4748	349	5XX1 XX28 Ɛ502	389	6433 3837 2573
30X	54ƐX 7864 1Ɛ24	34X	5XƐ6 Ɛ50Ɛ 3203	38X	6446 96Ɛ1 33Ɛ8
30Ɛ	5515 6015 2739	34Ɛ	5Ɛ0Ɛ Ɛ6Ɛ0 X777	38Ɛ	645X 3649 631X
311	5547 10Ɛ6 1538	351	5Ɛ39 X781 9337	391	6485 24Ɛ5 4682
312	5561 9X31 X5X9	352	5Ɛ52 9676 X22Ɛ	392	6498 7409 4801
313	5578 6163 8840	353	5Ɛ67 807X X378	393	64XƐ ƐƐ10 4413
314	5593 1X93 6857	354	5Ɛ80 6194 7Ɛ73	394	6503 4204 5714
315	55X9 9205 2X48	355	5Ɛ95 3X03 1396	395	6516 80XƐ X351
316	5604 3Ɛ40 7261	356	5ƐXX 1149 0345	396	6529 Ɛ790 8191
317	561X X285 5564	357	6002 9ƐƐ1 2708	397	6541 2X69 0915
318	5635 401Ɛ 7063	358	6017 6576 5918	398	6554 5943 169Ɛ
319	564Ɛ 938X 90Ɛ3	359	6030 2663 7160	399	6567 8418 ƐX67
31X	5666 2156 847Ɛ	35X	6044 X277 3977	39X	657X X6Ɛ4 8X33
31Ɛ	5680 6543 1601	35Ɛ	6059 55Ɛ8 4878	39Ɛ	6592 0594 5642
321	56Ɛ1 1790 1936	361	6086 6X51 6000	3X1	65Ɛ8 3370 14X1
322	5707 4638 064X	362	609Ɛ 0Ɛ6X Ɛ2X7	3X2	660Ɛ 4270 1ƐX0
323	5721 6Ɛ17 0367	363	60Ɛ3 6X04 658Ɛ	3X3	6622 4980 5046
324	5737 8X30 8191	364	6107 ƐƐ98 Ɛ814	3X4	6635 50X2 XX93
325	5751 X384 6X83	365	6120 4XƐ2 X780	3X5	6648 5019 7989
326	5767 Ɛ35X 8080	366	6134 9550 XX22	3X6	665Ɛ 476X 7X52
327	5781 Ɛ979 2X87	367	6149 1735 7983	3X7	6672 3Ɛ17 Ɛ058
328	5797 ƐX25 0468	368	6161 5467 8845	3X8	6685 2XX3 51Ɛ1
329	57Ɛ1 Ɛ521 1281	369	6175 8929 8673	3X9	6698 168Ɛ 1Ɛ39
32X	5807 X670 XX3Ɛ	36X	6189 Ɛ942 2273	3XX	66XX ƐX99 0Ɛ7X
32Ɛ	5821 9257 X569	36Ɛ	61X2 24XƐ 8453	3XƐ	6701 9Ɛ0Ɛ 1856
331	5851 5188 XƐ25	371	620X 6657 ƐƐ12	3Ɛ1	6727 502Ɛ 55Ɛ8
332	5867 2519 89Ɛ8	372	6222 805Ɛ 994X	3Ɛ2	673X 2121 6X30
333	5880 Ɛ317 2914	373	6236 9206 9061	3Ɛ3	6750 XX43 6615
334	5896 7784 8718	374	624X 9Ɛ17 85XƐ	3Ɛ4	6763 7397 3384
335	58Ɛ0 36X5 5Ɛ47	375	6262 X393 X909	3Ɛ5	6776 3562 7Ɛ7Ɛ
336	5905 Ɛ080 X244	376	6276 X3ƐƐ 0347	3Ɛ6	6788 Ɛ363 7129
337	591Ɛ 6116 0559	377	628X 9Ɛ97 142X	3Ɛ7	679Ɛ 699Ɛ Ɛ229
338	5935 0830 3726	378	62X2 9326 70Ɛ9	3Ɛ8	67Ɛ2 2055 6706
339	594X 6X0X X310	379	62Ɛ6 822Ɛ XƐƐƐ	3Ɛ9	6804 8Ɛ4X 3679
33X	5964 0374 X98X	37X	630X 68Ɛ1 4178	3ƐX	6817 3684 0277
33Ɛ	5979 59X9 74X9	37Ɛ	6322 4Ɛ31 4X12	3ƐƐ	6829 9X10 6726

TABLE 5.—Logarithms to 10 Dwecimals.

401	6852 9689 4006	441	7109 7586 4271	481	7543 1011 7Ɛ30
402	6865 2Ɛ61 25X2	442	711X Ɛ698 X6Ɛ5	482	7553 5834 36X8
403	6877 8083 1745	443	7130 34X1 X244	483	7563 X19X 0387
404	688X 0X34 XX02	444	7141 6Ɛ9X 7Ɛ60	484	7574 2487 Ɛ817
405	68X0 5438 35X3	445	7152 X390 8807	485	7584 64ƐƐ 3199
406	68Ɛ2 9693 0979	446	7164 1479 508Ɛ	486	7594 X279 0189
407	6905 1582 ƐXX2	447	7175 4262 1945	487	75X5 1982 4017
408	6917 5109 9971	448	7186 6944 348Ɛ	488	75Ɛ5 5214 4069
409	6929 84Ɛ1 3489	449	7197 9125 2491	489	7605 83Ɛ4 15X5
40X	693Ɛ Ɛ533 159Ɛ	44X	71X8 Ɛ206 3244	48X	7615 Ɛ322 9624
40Ɛ	6952 2215 0920	44Ɛ	71ƐX 0ƐX8 X16X	48Ɛ	7626 1ƐX1 52Ɛ9
411	6976 6944 114X	451	7220 3X7Ɛ Ɛ42Ɛ	491	7646 6953 0035
412	6988 8794 7069	452	7231 4Ɛ73 1Ɛ19	492	7656 8X48 1031
413	699X X28Ɛ ƐX63	453	7242 5971 3263	493	7666 X895 5775
414	69Ɛ0 Ɛ633 Ɛ938	454	7253 6477 719Ɛ	494	7677 0478 2848
415	6X03 0646 298X	455	7264 688Ɛ 5773	495	7687 19Ɛ5 4ƐƐ4
416	6X15 1308 4Ɛ49	456	7275 69Ɛ2 2563	496	7697 308X 12Ɛ7
417	6X27 1840 207Ɛ	457	7286 6825 1443	497	76X7 40ƐƐ 415Ɛ
418	6X39 1X27 1X88	458	7297 6369 5ƐƐƐ	498	76Ɛ7 4X8X 22X8
419	6X4Ɛ 1887 0169	459	72X8 5804 7Ɛ56	499	7707 55Ɛ7 81X6
41X	6X61 13X1 43Ɛ9	45X	72Ɛ9 4973 X8XX	49X	7717 5X84 X462
41Ɛ	6X73 0773 9Ɛ73	45Ɛ	730X 3838 5974	49Ɛ	7727 60Ɛ2 9428
421	6X96 X513 6Ɛ18	461	7330 0912 X184	4X1	7747 59Ɛ4 Ɛ134
422	6XX8 8XX4 085X	462	7340 XƐ27 1Ɛ44	4X2	7757 548Ɛ 2630
423	6XƐX 7137 09Ɛ2	463	7351 8X59 Ɛ0Ɛ0	4X3	7767 490X 8Ɛ66
424	6Ɛ10 5052 283Ɛ	464	7362 66Ɛ0 4749	4X4	7777 3XƐ3 3746
425	6Ɛ22 2832 ƐƐ4X	465	7373 4063 9703	4X5	7787 2X43 1745
426	6Ɛ34 009Ɛ 0791	466	7384 1339 4Ɛ22	4X6	7797 173X X05X
427	6Ɛ45 9213 Ɛ0X8	467	7394 X336 5653	4X7	77X7 01X8 4Ɛ13
428	6Ɛ57 6017 1X1Ɛ	468	73X5 7058 2265	4X8	77Ɛ6 X5Ɛ5 X2Ɛ5
429	6Ɛ69 26XX 35X5	469	73Ɛ6 86X3 9850	4X9	7806 8777 1Ɛ22
42X	6Ɛ7X XX52 X521	46X	7406 ƐX56 6826	4XX	7816 66X8 3X38
42Ɛ	6Ɛ90 6X8X 5024	46Ɛ	7417 7Ɛ35 792X	4XƐ	7826 438X 3X2Ɛ
431	6ƐƐ3 X184 6041	471	7438 Ɛ479 8439	4Ɛ1	7845 Ɛ228 912Ɛ
432	7005 5446 0836	472	7449 6925 0908	4Ɛ2	7855 83X7 191X
433	7017 03X4 7573	473	745X 1Ɛ01 704X	4Ɛ3	7865 531X 336X
434	7028 7021 8308	474	746X 8X10 5591	4Ɛ4	7875 2007 1354
435	703X 153X 8X43	475	747Ɛ 3652 X387	4Ɛ5	7884 X66X 7317
436	704Ɛ 7739 3023	476	748Ɛ X009 Ɛ817	4Ɛ6	7894 6X89 8850
437	7061 161X 8427	477	74X0 42ƐX Ɛ810	4Ɛ7	78X4 3065 505Ɛ
438	7072 71X4 6509	478	74Ɛ0 X327 03X8	4Ɛ8	78Ɛ3 XƐƐX 77ƐX
439	7084 0654 2840	479	7501 408Ɛ 3714	4Ɛ9	7903 6912 3XƐ4
43X	7095 57XƐ 2677	47X	7511 9770 Ɛ469	4ƐX	7913 23X5 50X4
43Ɛ	70X6 X032 Ɛ366	47Ɛ	7522 2Ɛ91 1638	4ƐƐ	7922 9838 X479

TABLE 5. Logarithms to 10 Dwecimals.

501	7941 ΛX28 6281	541	810Λ 9X7Λ 7XX8	581	8471 1027 7X22
502	7951 6786 6ΛΛ6	542	811X 8031 6861	582	847Λ 3616 21ΛΛ
503	7961 12X8 8522	543	8129 5Λ9Λ 7399	583	8489 5X2X 12Λ8
504	7970 7793 965Λ	544	8138 8946 6991	584	8497 8068 07ΛΛ
505	7980 1X44 9357	545	8147 14XΛ 22X3	585	84X5 X110 7Λ74
506	798Λ 7X80 671X	546	8155 XX52 2727	586	84Λ3 ΛΛX0 6806
507	799Λ 1884 0409	547	8164 81Λ3 4X63	587	8502 1898 4321
508	79XX 7454 1419	548	8173 5356 6005	588	8510 3400 826Λ
509	79ΛX 09Λ1 84X1	549	8182 22Λ9 2X75	589	851X 4952 1Λ59
50X	7X09 6119 8307	54X	8190 Λ061 4485	58X	8528 6111 4X97
50Λ	7X18 Λ214 Λ717	54Λ	819Λ 7807 7440	58Λ	8536 72ΛΛ 0516
511	7X37 8938 Λ393	551	81Λ9 0525 4X35	591	8552 9163 X766
512	7X47 1367 4X54	552	8207 869X 4X78	592	8560 9X20 3Λ26
513	7X56 5768 8329	553	8216 4658 5471	593	856X X509 7107
514	7X65 9941 7ΛX9	554	8225 0420 301Λ	594	8578 XX28 3407
515	7X75 18XΛ 2584	555	8233 7ΛXX 64Λ5	595	8586 Λ178 ΛXXX
516	7X84 5632 2144	556	8242 3584 0224	596	8594 Λ340 3ΛΛ9
517	7X93 914Λ 5318	557	8250 X965 4X84	597	85X2 Λ336 X941
518	7XX3 0643 X292	558	825Λ 5Λ53 50XX	598	85Λ0 Λ165 3490
519	7XΛ2 3914 3356	559	826X 0Λ4X 92X3	599	85ΛX XX08 0Λ79
51X	7Λ01 6981 67Λ6	55X	8278 7954 1X25	59X	8608 X4X8 X720
51Λ	7Λ10 9808 665Λ	55Λ	8287 2568 3427	59Λ	8616 99Λ5 341X
521	7Λ2Λ 2X37 0422	561	82X4 3403 674X	5X1	8632 8303 2441
522	7Λ3X 5220 2541	562	82Λ2 9648 1125	5X2	8640 7300 X786
523	7Λ49 73X6 546Λ	563	8301 36X2 1XΛ1	5X3	864X 6136 50X5
524	7Λ58 9352 7184	564	830Λ 954X 53Λ4	5X4	8658 49X8 7719
525	7Λ67 Λ0X1 5801	565	831X 8209 7730	5X5	8666 3497 X171
526	7Λ77 0813 XX42	566	8328 88X0 4Λ58	5X6	8674 1X04 86Λ3
527	7Λ86 212X 8710	567	8337 2187 56X3	5X7	8682 016Λ 9978
528	7Λ95 342X 8814	568	8345 7487 5734	5X8	868Λ X355 87X3
529	7ΛX4 4514 8XX1	569	8354 05X1 1233	5X9	8699 837X ΛΛ56
52X	7ΛΛ3 53X5 702X	56X	8362 5511 04Λ8	5XX	86X7 6224 2603
52Λ	8002 6062 0894	56Λ	8370 X257 Λ422	5XΛ	86Λ5 3Λ09 Λ0X0
531	8029 6Λ59 16Λ7	571	8389 7379 4555	5Λ1	8710 XΛX1 12Λ5
532	802Λ 7199 3Λ34	572	8397 Λ755 2735	5Λ2	871X 838Λ 8350
533	803X 7208 4412	573	83X6 394X 8523	5Λ3	8728 5601 0254
534	8049 7027 0375	574	83Λ4 7962 5X19	5Λ4	8736 2675 77XΛ
535	8058 6836 1371	575	8402 Λ795 2898	5Λ5	8743 Λ572 134X
536	8067 6236 493Λ	576	8411 3427 6Λ58	5Λ6	8751 82Λ2 Λ830
537	8076 5628 8180	577	841Λ 6X9X 2411	5Λ7	875Λ 8X78 9558
538	8085 4811 8904	578	8429 X371 8830	5Λ8	8769 1488 11X2
539	8094 37XX 3Λ48	579	8438 1666 9927	5Λ9	8776 9921 53X2
53X	80X3 257Λ 3034	57X	8446 4782 13X9	5ΛX	8784 6001 4583
53Λ	80Λ2 1145 3295	57Λ	8454 7700 30X3	5ΛΛ	8792 2128 513X

TABLE 5.—Logarithms to 10 Dwecimals.

601	87X9 5X9X 0842	641	8Λ04 1Λ5X 7041	681	91ΛΛ 8X22 5654
602	87Λ7 1725 8634	642	8Λ11 36Λ1 00X8	682	9208 4ΛΛ4 64ΛX
603	8804 91ΛX 7709	643	8Λ1X 50Λ0 3648	683	9215 104Λ 768X
604	8812 4721 4337	644	8Λ27 6558 XX60	684	9221 8Λ70 176X
605	881Λ ΛX92 4Λ40	645	8Λ34 7873 3481	685	922X 4956 5327
606	8829 7092 3Λ28	646	8Λ41 8X37 X719	686	9237 0606 Λ125
607	8837 2121 7695	647	8Λ4X 9X6Λ 19Λ2	687	9243 8141 Λ8Λ0
608	8844 9000 X16X	648	8Λ57 X951 6542	688	9250 3748 Λ966
609	8852 3930 5XX4	649	8Λ64 Λ6X8 5960	689	9258 Λ011 3X14
60X	885Λ X4Λ1 1183	64X	8Λ72 02X5 5235	68X	9265 6366 455X
60Λ	8869 4Λ03 20X0	64Λ	8Λ7Λ 0957 9Λ46	68Λ	9272 1587 6243
611	8884 5661 99X5	651	8Λ95 1653 8827	691	9287 362Λ 7257
612	8891 Λ7XΛ 5004	652	8ΛX2 189X 1239	692	9293 X473 362X
613	889Λ 5790 6706	653	8ΛXΛ 1996 814X	693	92X0 5184 706Λ
614	88X8 Λ605 884Λ	654	8ΛΛ8 1945 X81X	694	92X8 Λ963 X33X
615	88Λ6 5293 5548	655	9005 1768 2104	695	92Λ5 6411 581X
616	8903 X9Λ6 2XΛX	656	9012 1441 Λ633	696	9302 0949 9874
617	8911 4372 71Λ5	657	901Λ 0Λ8Λ 81Λ5	697	930X 7155 2X04
618	891X 9785 0296	658	9028 0591 91Λ1	698	9317 1430 1575
619	8928 2X32 0193	659	9034 ΛX48 77X1	699	9323 7596 X048
61X	8935 7Λ36 0XXΛ	65X	9041 Λ178 891Λ	69X	9330 1611 8Λ29
61Λ	8943 0X95 85Λ9	65Λ	904X X362 571X	69Λ	9338 7519 26X0
621	8959 X525 7Λ98	661	9064 8318 6924	6X1	9351 6Λ63 3644
622	8967 3016 Λ8X9	662	9071 70X9 9297	6X2	935X 06X2 76X9
623	8974 7565 X073	663	907X 5936 381Λ	6X3	9366 60Λ3 Λ950
624	8981 Λ952 895Λ	664	9087 443X 7169	6X4	9372 Λ597 85X1
625	898Λ 3Λ9X 19XX	665	9094 29ΛΛ 0714	6X5	937Λ 4952 1ΛΛ0
626	8998 8084 6ΛΛ2	666	90X1 1238 1086	6X6	9387 9Λ9Λ 872X
627	89X6 000X 6154	667	90X9 Λ532 1609	6X7	9394 3100 872X
628	89Λ3 39Λ4 5009	668	90Λ6 96X5 6X85	6X8	93X0 80Λ5 6825
629	8X00 763X 9523	669	9103 7716 X1Λ6	6X9	93X9 0Λ82 5X32
62X	8X09 Λ126 11ΛX	66X	9110 5606 42Λ9	6XX	93Λ5 5923 Λ748
62Λ	8X17 2672 9Λ48	66Λ	9119 3374 6087	6XΛ	9401 X55X 894X
631	8X31 90Λ2 5672	671	9132 X68X 4533	6Λ1	9416 7653 0271
632	8X3Λ 01X6 3916	672	913Λ 8036 X90Λ	6Λ2	9422 ΛΛ12 0X79
633	8X48 3141 5984	673	9148 5463 836X	6Λ3	942Λ 4267 4941
634	8X55 5Λ40 5415	674	9155 2751 1X98	6Λ4	9437 8497 408X
635	8X62 87X3 7ΛΛ4	675	9161 Λ8ΛΛ 8475	6Λ5	9444 05X2 2X89
636	8X6Λ Λ2XΛ 7465	676	916X 892Λ 8682	6Λ6	9450 4584 5512
637	8X79 1860 9101	677	9177 6821 725X	6Λ7	9458 8442 3954
638	8X86 4077 6831	678	9184 2595 9140	6ΛX	9465 0198 2129
639	8X93 6338 58Λ8	679	9190 Λ210 7043	6Λ9	9471 3X0X 4593
63X	8XX0 8463 Λ973	67X	9199 790X 585Λ	6ΛX	9479 7519 302X
63Λ	8XX9 X436 6449	67Λ	91X6 428Λ 9X63	6ΛΛ	9485 XΛ05 197X

TABLE 5.—Logarithms to 10 Dwecimals.

701	949X 5731 4481	741	9762 359X X703	781	9X10 X794 X82Ɛ
702	94X6 8972 4372	742	976X 2217 7351	782	9X18 5290 Ɛ853
703	94Ɛ2 ƐX91 8813	743	9776 0945 8Ɛ62	783	9X23 Ɛ88Ɛ 726X
704	94ƐƐ 2X8Ɛ 9659	744	9781 Ɛ365 7139	784	9X2Ɛ 6191 0352
705	9507 5968 XXX8	745	9789 9877 5288	785	9X37 0595 5Ɛ85
706	9513 8725 4941	746	9795 807Ɛ 6964	786	9X42 68X1 33Ɛ8
707	951Ɛ Ɛ381 7186	747	97X1 6376 3348	787	9X4X 0XƐ0 7489
708	9528 1XƐ9 9Ɛ86	748	97X9 4563 X1X3	788	9X55 7003 9244
709	9534 4516 52Ɛ3	749	97Ɛ5 2644 6X44	789	9X61 101X Ɛ920
70X	9540 6X13 8XX2	74X	9801 0618 8X27	78X	9X68 6Ɛ3X 613Ɛ
70Ɛ	9548 91Ɛ2 0X8X	74Ɛ	9808 X4X4 7675	78Ɛ	9X74 0962 72Ɛ5
711	9561 1613 16ƐƐ	751	9820 5Ɛ18 8935	791	9X87 0301 5X57
712	9569 3656 6135	752	9828 3685 6144	792	9X92 5X38 940X
713	9575 5580 274X	753	9834 1127 1976	793	9X99 Ɛ479 7667
714	9581 7388 6ƐƐ7	754	983Ɛ X681 Ɛ285	794	9XX5 4X04 3563
715	9589 9077 Ɛ154	755	9847 7Ɛ12 1911	795	9XƐ0 X255 005Ɛ
716	9595 X84X 6X24	756	9853 5258 0924	796	9XƐ8 35Ɛ0 02XƐ
717	95X2 0304 X051	757	985Ɛ 2497 Ɛ737	797	9Ɛ03 8851 7010
718	95XX 1863 0325	758	9866 Ɛ612 176X	798	9Ɛ0Ɛ 19Ɛ9 Ɛ330
719	95Ɛ6 30X5 6157	759	9872 8642 X20X	799	9Ɛ16 6X71 3Ɛ69
71X	9602 4410 6804	75X	987X 556X 4690	79X	9Ɛ21 ƐX30 0008
71Ɛ	960X 5620 5Ɛ69	75Ɛ	9886 2391 0152	79Ɛ	9Ɛ29 48Ɛ6 2383
721	9622 76Ɛ4 3Ɛ68	761	9899 7904 7Ɛ78	7X1	9Ɛ40 2366 1388
722	962X 8578 X284	762	98X5 4416 2X34	7X2	9Ɛ47 6Ɛ50 396X
723	9636 9327 6421	763	98Ɛ1 0X24 0120	7X3	9Ɛ52 Ɛ643 0154
724	9642 9Ɛ80 8100	764	98Ɛ8 932X 2Ɛ78	7X4	9Ɛ5X 4042 51X2
725	964X X700 7208	765	9904 5731 2891	7X5	9Ɛ65 854X 991Ɛ
726	9656 Ɛ127 7412	766	9910 1X31 2785	7X6	9Ɛ71 0964 4087
727	9662 Ɛ63X 0390	767	9917 X02X 5Ɛ4X	7X7	9Ɛ78 5087 5187
728	966X ƐX38 1961	768	9923 6125 3X86	7X8	9Ɛ83 92Ɛ8 1736
729	9677 0122 3589	769	992Ɛ 2119 Ɛ845	7X9	9Ɛ8Ɛ 1436 905X
72X	9683 02Ɛ4 907Ɛ	76X	9936 X010 8703	7XX	9Ɛ96 5483 6330
72Ɛ	968Ɛ 0373 X250	76Ɛ	9942 5X01 9926	7XƐ	9ƐX1 941X 8154
731	96X3 0175 1X25	771	9955 02X0 1995	7Ɛ1	9ƐƐ4 5039 0Ɛ11
732	96XX ƐXƐ7 Ɛ79Ɛ	772	9961 4989 Ɛ087	7Ɛ2	9ƐƐƐ 8900 959Ɛ
733	96Ɛ6 Ɛ728 7756	773	9969 3377 1431	7Ɛ3	X007 0493 9X65
734	9702 Ɛ247 546Ɛ	774	9974 7863 ƐX51	7Ɛ4	X012 3Ɛ76 4X77
735	970X X854 8666	775	9980 3050 9915	7Ɛ5	X019 7568 9356
736	9716 X150 8871	776	9987 X339 X219	7Ɛ6	X024 XX6Ɛ 1X2Ɛ
737	9722 9537 959Ɛ	777	9993 5527 4324	7Ɛ7	X030 2281 9419
738	972X 8812 252X	778	999Ɛ 0615 71X5	7Ɛ8	X037 55X4 X629
739	9736 7998 8185	779	99X6 7604 9Ɛ7X	7Ɛ9	X042 8818 815X
73X	9742 6X52 31Ɛ4	77X	99Ɛ2 24Ɛ5 39Ɛ4	7ƐX	X049 Ɛ961 4X98
73Ɛ	974X 59Ɛ8 6072	77Ɛ	99Ɛ9 92X7 3X05	7ƐƐ	X055 29Ɛ7 3700

TABLE 5.—Logarithms to 10 Dwecimals.

801	X067 881Ɛ 569X	841	X2Ɛ0 101X 7910	881	X523 1321 Ɛ009
802	X072 Ɛ5XX 2378	842	X2Ɛ7 0434 528X	882	X529 94X7 2623
803	X07X 228X Ɛ987	843	X301 Ɛ76X 5622	883	X534 5599 9123
804	X085 4X82 0954	844	X308 XX04 Ɛ010	884	X53Ɛ 15Ɛ9 8X66
805	X090 7587 7Ɛ16	845	X313 9Ɛ80 0104	885	X545 9547 3Ɛ82
806	X097 9ƐX8 ƐXƐ7	846	X31X 9057 Ɛ164	886	X550 5402 85Ɛ6
807	X0X3 0513 3514	847	X325 8054 X605	887	X557 11X8 0682
808	X0XX 2955 9174	848	X330 6Ɛ73 06Ɛ1	888	X561 8XƐƐ 6312
809	X0Ɛ5 50XƐ 7851	849	X337 59Ɛ2 7860	889	X568 4741 3846
80X	X100 7359 1954	84X	X342 4753 X300	88X	X573 02Ɛ1 6Ɛ79
80Ɛ	X107 951X 6059	84Ɛ	X349 3416 X670	88Ɛ	X579 7990 61Ɛ7
811	X11X 15X1 7747	851	X35Ɛ 0707 1940	891	X58X X917 0787
812	X125 34X3 X254	852	X365 Ɛ184 9459	892	X595 6183 00Ɛ7
813	X130 52ƐX 95Ɛ0	853	X370 9685 0082	893	X5X0 155X 38Ɛ0
814	X137 702X 8123	854	X377 7Ɛ38 0191	894	X5X6 8865 1841
815	X142 8873 8770	855	X382 6311 ƐƐ56	895	X5Ɛ1 3X9Ɛ 7ƐƐ8
816	X149 X412 183Ɛ	856	X389 460Ɛ 1956	896	X5Ɛ7 Ɛ046 0843
817	X154 ƐX86 1X70	857	X394 282Ɛ 7Ɛ47	897	X602 6120 5X23
818	X160 1453 Ɛ951	858	X39Ɛ 0973 8893	898	X609 1127 15Ɛ6
819	X167 2937 9ƐX2	859	X3X5 XX1Ɛ 6513	899	X613 8062 1819
81X	X172 4135 Ɛ092	85X	X3Ɛ0 89XƐ 3396	89X	X61X 2Ɛ09 8520
81Ɛ	X179 544X 5703	85Ɛ	X3Ɛ7 68X3 1821	89Ɛ	X624 98X5 Ɛ946
821	X18Ɛ 7803 925Ɛ	861	X409 243Ɛ ƐƐ0X	8X1	X635 Ɛ231 445Ɛ
822	X196 8864 Ɛ500	862	X414 00X5 43Ɛ3	8X2	X640 59X0 97X1
823	X1X1 9821 534X	863	X41X 9873 7326	8X3	X647 0481 7729
824	X1X8 X6Ɛ5 541Ɛ	864	X425 7366 XƐX8	8X4	X651 6X94 028X
825	X1Ɛ3 Ɛ4X5 2177	865	X430 4983 58Ɛ2	8X5	X658 1418 1647
826	X1ƐƐ 01Ɛ0 X214	866	X437 2505 5925	8X6	X662 7892 1615
827	X206 0X14 7Ɛ9Ɛ	867	X441 Ɛ771 1364	8X7	X669 207X 21X2
828	X211 1554 X0XX	868	X448 8Ɛ42 6679	8X8	X673 8398 5550
829	X218 1ƐƐ1 6Ɛ4Ɛ	869	X453 6239 Ɛ930	8X9	X67X 2629 1476
82X	X223 2567 1140	86X	X45X 345Ɛ 71Ɛ5	8XX	X684 87Ɛ0 3Ɛ25
82Ɛ	X22X 2X39 7070	86Ɛ	X465 05X7 6Ɛ37	8XƐ	X68Ɛ 28X6 309Ɛ
831	X240 3536 423X	871	X476 6637 45X1	8Ɛ1	X6X0 2872 XƐ7Ɛ
832	X247 3761 0431	872	X481 353Ɛ 6799	8Ɛ2	X6X6 8745 Ɛ7Ɛ5
833	X252 88X5 624Ɛ	873	X488 036X X001	8Ɛ3	X6Ɛ1 2550 4956
834	X259 3948 023X	874	X492 9105 487Ɛ	8Ɛ4	X6Ɛ7 828X 4371
835	X264 3908 8953	875	X499 5987 4ƐƐ2	8Ɛ5	X702 1Ɛ40 0183
836	X26Ɛ 87X7 X51Ɛ	876	X4X4 2575 0ƐƐ2	8Ɛ6	X708 7725 6308
837	X276 35X5 7696	877	X4XX Ɛ08X 6X85	8Ɛ7	X713 1243 06Ɛ2
838	X281 3302 276Ɛ	878	X4Ɛ5 7710 0X29	8Ɛ8	X719 6894 9060
839	X288 2Ɛ39 X082	879	X500 4079 9050	8Ɛ9	X724 025X 96XX
83X	X293 2694 8325	87X	X507 0553 9718	8ƐX	X72X 5759 4126
83Ɛ	X29X 214X Ɛ81X	87Ɛ	X511 8956 4821	8ƐƐ	X734 XƐ90 6656

TABLE 5.—Logarithms to 10 Dwecimals.

901	X745 9619 6973	941	X959 0622 0104	981	XΛ61 7X97 1778
902	X750 2833 8535	942	X963 2Λ32 62X2	982	XΛ67 7915 94X6
903	X756 7983 175X	943	X969 5383 6325	983	XΛ71 769Λ 475X
904	X761 0X48 02Λ6	944	X973 7755 1X5X	984	XΛ77 73Λ0 09X2
905	X767 5X46 6250	945	X979 9X67 6910	985	XΛ81 7047 Λ637
906	X771 X97X 9462	946	X984 00ΛX X739	986	XΛ87 682Λ 2317
907	X778 3828 Λ7X3	947	X98X 2293 3155	987	XΛ91 6359 X675
908	X782 8611 2XΛΛ	948	X994 43X8 9Λ89	988	XΛ97 5X14 1XΛ8
909	X789 132Λ 9052	949	X99X 6443 8X40	989	XΛX1 5416 1X46
90X	X793 5Λ84 7X75	94X	X9X4 8420 154Λ	98X	XΛX7 4963 ΛXΛ7
90Λ	X799 X754 13Λ5	94Λ	X9XX X33X 1508	98Λ	XΛΛ1 4289 96X2
911	X7XX 789Λ 8548	951	X9ΛΛ 1Λ7Λ 6229	991	Λ001 2X09 9886
912	X7Λ5 0257 3X05	952	XX05 88X8 2389	992	Λ007 2104 3285
913	X7ΛΛ 474X 62XX	953	XX0Λ 5549 0590	993	Λ011 1347 2401
914	X805 8Λ79 9617	954	XX15 7135 241Λ	994	Λ017 0516 8667
915	X810 1323 059Λ	955	XX1Λ 8863 9698	995	Λ020 Λ632 Λ424
916	X816 5604 8002	956	XX25 X814 Λ957	996	Λ026 X698 0294
917	X820 9822 0X84	957	XX2Λ Λ908 X7X9	997	Λ030 968X 0811
918	X827 1977 4Λ98	958	XX36 1243 7996	998	Λ036 8609 21X9
919	X831 5X48 X12X	959	XX40 2701 4X99	999	Λ040 7495 61Λ0
91X	X837 9X56 60X0	95X	XX46 3Λ02 366Λ	99X	Λ046 62XΛ 21X1
91Λ	X842 19X0 6846	95Λ	XX50 5246 547Λ	99Λ	Λ050 5052 3737
921	X852 9662 5230	961	XX60 7721 11X1	9X1	Λ060 2581 4930
922	X859 139X 67XΛ	962	XX66 8873 X3X7	9X2	Λ066 1149 74X1
923	X863 5053 8024	963	XX70 994X 5212	9X3	Λ06Λ Λ863 9423
924	X869 8845 Λ079	964	XX76 X968 Λ3X3	9X4	Λ075 X308 0090
925	X874 0375 5693	965	XX80 Λ90Λ 6457	9X5	Λ07Λ 88ΛX 4ΛΛ4
926	X87X 3X22 5400	966	XX87 07Λ6 3Λ26	9X6	Λ085 723Λ 1720
927	X884 7409 018Λ	967	XX91 1625 573X	9X7	Λ08Λ 570X 3391
928	X88X X931 3942	968	XX97 2399 0ΛΛX	9X8	Λ095 3Λ27 Λ706
929	X895 2193 6015	969	XXX1 3095 3843	9X9	Λ09Λ 2294 3X35
92X	X89Λ 5573 8739	96X	XXX7 3916 8365	9XX	Λ0X5 058Λ 5689
92Λ	X8X5 8892 1416	96Λ	XXΛ1 44X0 1472	9XΛ	Λ0XX X815 6170
931	X8Λ6 3106 0328	971	XΛ01 5642 Λ44Λ	9Λ1	Λ0ΛX 6Λ12 971X
932	X900 621Λ 9Λ82	972	XΛ07 6020 2511	9Λ2	Λ104 4Λ86 8411
933	X906 9274 4X14	973	XΛ11 6542 X35Λ	9Λ3	Λ10X 2Λ89 17X9
934	X911 0247 X75X	974	XΛ17 69XΛ 065X	9Λ4	Λ114 0Λ1Λ 5Λ70
935	X917 315X 5088	975	XΛ21 71X0 X8X8	9Λ5	Λ119 XX01 5819
936	X921 5ΛΛ0 1X86	976	XΛ27 7518 6558	9Λ6	Λ123 8833 2266
937	X927 8981 2X31	977	XΛ31 779X 12ΛX	9Λ7	Λ129 65Λ4 8Λ83
938	X931 Λ691 981Λ	978	XΛ37 79X5 8814	9Λ8	Λ133 4306 3456
939	X938 2322 0119	979	XΛ41 7Λ37 6363	9Λ9	Λ139 1Λ67 X985
93X	X942 4XΛ1 Λ9XX	97X	XΛ47 8013 779X	9ΛX	Λ142 Λ759 882X
93Λ	X948 7601 X710	97Λ	XΛ51 8036 2371	9ΛΛ	Λ148 929Λ X4X1

TABLE 5.—Logarithms to 10 Dwecimals.

X01	Λ158 4395 6Λ20	X41	Λ345 9688 534X	X81	Λ526 6833 X778
X02	Λ162 1949 4633	X42	Λ34Λ 4957 X753	X82	Λ52Λ Λ9X0 625X
X03	Λ167 Λ251 Λ625	X43	Λ354 ΛΛ81 4872	X83	Λ535 4XX7 ΛΛ4Λ
X04	Λ171 86X7 5368	X44	Λ35X 7141 68Λ3	X84	Λ53X 9Λ52 5013
X05	Λ177 5X91 Λ2XX	X45	Λ364 2256 ΛΛ57	X85	Λ544 2Λ57 X629
X06	Λ181 3209 6894	X46	Λ369 9507 3821	X86	Λ549 7Λ60 574Λ
X07	Λ187 0496 5183	X47	Λ373 4312 1104	X87	Λ553 6X04 5552
X08	Λ190 96Λ4 7X11	X48	Λ378 Λ273 5536	X88	Λ558 5867 5143
X09	Λ196 6864 4250	X49	Λ382 616Λ 5ΛX4	X89	Λ561 X669 Λ52Λ
X0X	Λ1X0 3965 7709	X4X	Λ388 1602 3Λ73	X8X	Λ567 5410 6655
X0Λ	Λ1X6 09Λ8 744X	X4Λ	Λ391 79Λ0 0744	X8Λ	Λ570 8111 865X
X11	Λ1Λ5 6918 1650	X51	Λ3X0 9414 6X17	X91	Λ57Λ 6574 28X7
X12	Λ1ΛΛ 37X4 X77Λ	X52	Λ3X6 404Λ 6X82	X92	Λ584 X115 3214
X13	Λ205 0603 9685	X53	Λ3XΛ X821 X628	X93	Λ58X 2816 85XΛ
X14	Λ20X 9374 Λ78Λ	X54	Λ3Λ5 534Λ 6Λ86	X94	Λ593 7277 4577
X15	Λ214 6078 62Λ4	X55	Λ3ΛX ΛX14 9566	X95	Λ598 Λ578 7276
X16	Λ21X 2912 6853	X56	Λ404 6455 7253	X96	Λ5X2 421X 1227
X17	Λ223 Λ4ΛΛ 243X	X57	Λ40X 09Λ2 1502	X97	Λ5X7 871Λ Λ582
X18	Λ229 803X 6679	X58	Λ413 7506 55X0	X98	Λ5Λ1 0Λ82 2857
X19	Λ233 4710 8755	X59	Λ419 1776 8155	X99	Λ5Λ6 5585 0559
X1X	Λ239 1135 9X89	X5X	Λ422 7Λ82 Λ046	X9X	Λ5ΛΛ 9728 57Λ2
X1Λ	Λ242 96Λ1 Λ854	X5Λ	Λ428 2327 3313	X9Λ	Λ605 1X50 7541
X21	Λ252 2463 X2X7	X61	Λ437 2884 8595	XX1	Λ613 X29Λ 5123
X22	Λ257 X859 9745	X62	Λ440 8X79 ΛX69	XX2	Λ619 2446 51X6
X23	Λ261 6ΛX7 299X	X63	Λ446 500Λ 9499	XX3	Λ622 6552 21X6
X24	Λ267 8288 8206	X64	Λ44Λ 90ΛX 22X6	XX4	Λ627 X5ΛΛ 822X
X25	Λ270 Λ500 ΛΛ97	X65	Λ455 3145 570X	XX5	Λ631 2609 7400
X26	Λ276 7689 669Λ	X66	Λ45X 9129 2784	XX6	Λ636 6579 3823
X27	Λ280 37XX 02X0	X67	Λ464 506X 06ΛΛ	XX7	Λ63Λ X48X 5395
X28	Λ285 Λ862 635Λ	X68	Λ469 8Λ47 X727	XX8	Λ645 2841 1391
X29	Λ28Λ 786Λ 2053	X69	Λ473 2982 9X68	XX9	Λ64X 6155 4906
X2X	Λ295 3810 0935	X6X	Λ478 8756 Λ723	XXX	Λ653 9Λ0Λ 4867
X2Λ	Λ29X Λ705 3974	X6Λ	Λ482 2488 4Λ53	XXΛ	Λ659 1827 2322
X31	Λ2XX 3335 3XX1	X71	Λ491 1983 7229	XΛ1	Λ667 9104 6528
X32	Λ2Λ3 Λ070 368X	X72	Λ496 7549 6552	XΛ2	Λ671 0886 8236
X33	Λ2Λ9 6940 0813	X73	Λ4X0 1071 2008	XΛ3	Λ676 45XX 1997
X34	Λ303 2564 8644	X74	Λ4X5 6732 7076	XΛ4	Λ67Λ 7X74 3460
X35	Λ308 X122 44X8	X75	Λ4XΛ 0151 X8Λ5	XΛ5	Λ684 Λ4X0 8Λ19
X36	Λ312 5835 1708	X76	Λ4Λ4 570Λ 22ΛX	XΛ6	Λ68X 2X6Λ 7656
X37	Λ318 12X1 1421	X77	Λ4Λ9 Λ026 687Λ	XΛ7	Λ693 65X1 0314
X38	Λ321 88X2 4Λ67	X78	Λ503 44X0 13X6	XΛ8	Λ698 9875 0197
X39	Λ327 4239 1854	X79	Λ508 98Λ3 Λ260	XΛ9	Λ6X2 10XΛ 831X
X3X	Λ330 Λ729 4X11	X7X	.512 3066 1647	XΛX	Λ6X7 4489 1799
X3Λ	Λ336 6Λ73 3783	X7Λ	Λ517 8376 9541	XΛΛ	Λ6Λ0 7809 5444

TABLE 5.—Logarithms to 10 Dwecimals.

Ɛ01	Ɛ6ƐƐ 2136 ƐƐ50	Ɛ41	Ɛ888 1792 0X9X	Ɛ81	ƐX49 X769 6037
Ɛ02	Ɛ704 5324 4Ɛ00	Ɛ42	Ɛ891 2Ɛ48 6194	Ɛ82	ƐX52 X224 07Ɛ3
Ɛ03	Ɛ709 8475 0477	Ɛ43	Ɛ896 426X 182X	Ɛ83	ƐX57 9849 5415
Ɛ04	Ɛ712 Ɛ568 Ɛ497	Ɛ44	Ɛ89Ɛ 5537 0571	Ɛ84	ƐX60 9221 8Ɛ38
Ɛ05	Ɛ718 2604 2ƐƐ5	Ɛ45	Ɛ8X4 676Ɛ 352Ɛ	Ɛ85	ƐX65 8765 03Ɛ4
Ɛ06	Ɛ721 5603 0263	Ɛ46	Ɛ8X9 794X Ɛ66X	Ɛ86	ƐX6X 8057 4456
Ɛ07	Ɛ726 8565 40Ɛ1	Ɛ47	Ɛ8Ɛ2 8X96 18XX	Ɛ87	ƐX73 74Ɛ8 9Ɛ32
Ɛ08	Ɛ72Ɛ Ɛ46Ɛ 3766	Ɛ48	Ɛ8Ɛ7 9Ɛ88 XƐ71	Ɛ88	ƐX78 6909 5X8Ɛ
Ɛ09	Ɛ735 2318 ƐX8X	Ɛ49	Ɛ900 Ɛ027 41Ɛ1	Ɛ89	ƐX81 6089 5132
Ɛ0X	Ɛ73X 512X 5XX2	Ɛ4X	Ɛ906 0031 6326	Ɛ8X	ƐX86 53Ɛ8 8522
Ɛ0Ɛ	Ɛ743 7XX3 X824	Ɛ4Ɛ	Ɛ90Ɛ 0ƐX3 6284	Ɛ8Ɛ	ƐX8Ɛ 4697 48X0
Ɛ11	Ɛ752 1482 878X	Ɛ51	Ɛ919 2987 3531	Ɛ91	ƐX99 2Ɛ23 386X
Ɛ12	Ɛ757 40X8 3X55	Ɛ52	Ɛ922 37Ɛ9 2693	Ɛ92	ƐXX2 2090 812X
Ɛ13	Ɛ760 6876 1Ɛ52	Ɛ53	Ɛ927 4597 3343	Ɛ93	ƐXX7 11X9 8X95
Ɛ14	Ɛ765 93X8 3XX6	Ɛ54	Ɛ930 5321 6621	Ɛ94	ƐXƐ0 0276 6Ɛ55
Ɛ15	Ɛ76X ƐX82 X8Ɛ8	Ɛ55	Ɛ935 6014 1246	Ɛ95	ƐXƐ4 Ɛ2Ɛ3 3159
Ɛ16	Ɛ774 2501 Ɛ5X5	Ɛ56	Ɛ93X 6873 030Ɛ	Ɛ96	ƐXƐ9 X29Ɛ X308
Ɛ17	Ɛ779 4XX5 7184	Ɛ57	Ɛ943 747X 4748	Ɛ97	ƐƐ02 9238 5246
Ɛ18	Ɛ782 7431 X86X	Ɛ58	Ɛ948 8032 3249	Ɛ98	ƐƐ07 8145 0975
Ɛ19	Ɛ787 9922 Ɛ26Ɛ	Ɛ59	Ɛ951 8752 8Ɛ1Ɛ	Ɛ99	ƐƐ10 7601 9XƐ1
Ɛ1X	Ɛ791 0178 9794	Ɛ5X	Ɛ956 921Ɛ X888	Ɛ9X	ƐƐ15 5X2X 9452
Ɛ1Ɛ	Ɛ796 2577 7027	Ɛ5Ɛ	Ɛ95Ɛ 9855 9613	Ɛ9Ɛ	ƐƐ1X 4808 0031
Ɛ21	Ɛ7X4 7028 26X4	Ɛ61	Ɛ969 X788 1841	ƐX1	ƐƐ28 2253 632Ɛ
Ɛ22	Ɛ7X9 929X 2906	Ɛ62	Ɛ972 Ɛ084 3Ɛ17	ƐX2	ƐƐ31 0Ɛ01 Ɛ667
Ɛ23	Ɛ7Ɛ2 Ɛ4Ɛ5 5X4Ɛ	Ɛ63	Ɛ977 Ɛ52X 4970	ƐX3	ƐƐ35 Ɛ720 Ɛ457
Ɛ24	Ɛ7Ɛ8 1676 0XX7	Ɛ64	Ɛ980 Ɛ941 2298	ƐX4	ƐƐ3X X2Ɛ0 6702
Ɛ25	Ɛ801 37X0 0X47	Ɛ65	Ɛ986 0101 2161	ƐX5	ƐƐ43 8X30 X026
Ɛ26	Ɛ806 586Ɛ 6895	Ɛ66	Ɛ98Ɛ 042X 5470	ƐX6	ƐƐ48 7521 X606
Ɛ27	Ɛ80Ɛ 78X4 75Ɛ6	Ɛ67	Ɛ994 0705 0Ɛ0X	ƐX7	ƐƐ51 5Ɛ83 8X5X
Ɛ28	Ɛ814 9883 418Ɛ	Ɛ68	Ɛ999 0949 1779	ƐX8	ƐƐ56 4596 6Ɛ61
Ɛ29	Ɛ819 Ɛ807 97Ɛ6	Ɛ69	Ɛ9X2 0Ɛ3X 8523	ƐX9	ƐƐ5Ɛ 2Ɛ5X 2705
Ɛ2X	Ɛ823 16Ɛ6 104X	Ɛ6X	Ɛ9X7 1099 X260	ƐXX	ƐƐ64 1492 Ɛ700
Ɛ2Ɛ	Ɛ828 354X 32X3	Ɛ6Ɛ	Ɛ9Ɛ0 11X6 7X46	ƐXƐ	ƐƐ68 Ɛ978 9939
Ɛ31	Ɛ836 70Ɛ0 8094	Ɛ71	Ɛ9ƐX 1285 64X3	ƐƐ1	ƐƐ76 8620 1059
Ɛ32	Ɛ83Ɛ 89ƐƐ 0782	Ɛ72	ƐX03 1257 90Ɛ3	ƐƐ2	ƐƐ7Ɛ 6999 790X
Ɛ33	Ɛ844 X673 7Ɛ5X	Ɛ73	ƐX08 1197 Ɛ266	ƐƐ3	ƐƐ84 5108 6Ɛ55
Ɛ34	Ɛ84X 0292 6ƐX2	Ɛ74	ƐX11 1086 1842	ƐƐ4	ƐƐ89 33X8 Ɛ554
Ɛ35	Ɛ853 1X57 X850	Ɛ75	ƐX16 0Ɛ22 5504	ƐƐ5	ƐƐ92 163X X0X1
Ɛ36	Ɛ858 3587 8099	Ɛ76	ƐX1Ɛ 0928 Ɛ32X	ƐƐ6	ƐƐ96 Ɛ842 3754
Ɛ37	Ɛ861 5062 0079	Ɛ77	ƐX24 06X1 8174	ƐƐ7	ƐƐ9Ɛ 99Ɛ7 4Ɛ01
Ɛ38	Ɛ866 66X2 Ɛ75Ɛ	Ɛ78	ƐX29 0404 8X92	ƐƐ8	ƐƐX4 7Ɛ22 2935
Ɛ39	Ɛ86Ɛ 808X 78XƐ	Ɛ79	ƐX32 0096 2534	ƐƐ9	ƐƐX9 5ƐƐX X002
Ɛ3X	Ɛ874 9621 1455	Ɛ7X	ƐX36 Ɛ916 178Ɛ	ƐƐX	ƐƐƐ2 4049 34Ɛ0
Ɛ3Ɛ	Ɛ879 XƐ1X 5575	Ɛ7Ɛ	ƐX3Ɛ Ɛ504 7487	ƐƐƐ	ƐƐƐ7 2049 7982

COMMENTS ON DOUZE NOTRE DIX FUTUR AND OUR SEAL

by H. C. Churchman

The splendid work by M. Essig arrived and I have been browsing evenings through it for a week with that contented look in my eyes we usually find in the faces of Borden's Evaporated Milk cows. And the simile is not far afield, for Jean Essig has condensed more in less space than Borden ever succeeded in doing with the most modern of equipment.

His work clearly represents a prodigious amount of study and his bibliography is not only quite complete but should serve as an excellent base for a history of the progress of the duodecimal movement in the modern world. In addition to his thoroughness of presentation of the bare elements of arithmetic, I must applaud his personal courage in daring to advance this subject in the French language and in the heart and soul of the land which gave birth to the metric system. That does not happen every day!

The arithmetical schism, commonly called the rise of the metric system, which saw its beginnings in the latter part of the 16th Century, was not all bad by any means or measure. Being a definite swing away from the historical dozenal steps by which the foot, the Troy pound, the shilling, and other things of value were then being divided, it created two camps---the one gone stark modern, and the other holding fast to tradition. The show of tenacity with which our English and American forebears held their lines and closed ranks, sometimes from necessity giving a little here and some there, but, on the whole, retaining their dozenal divisions of units, belongs to history.

When a person of not inconsiderable rank and authority in France lends voice and the printed word to our plight and recognizes the reasonableness of our resistance to the metre, the days of our strategic retreat may have drawn to an end. Time and patience are not only going to heal the breach between the two camps (as that twosome heals all schisms), but, nations and dominations and thrones and empires having thoroughly tested the base ten system of weights and measures and found it wanting in practical affairs, we shall, I believe, now purge our English foot and pound and gallon, our hour, our degree, our every step in counting above and below the single unit, of all base ten intrusions---and flower into the more scientific dozenal base numeration in weights and measurements of every nature. In the words of the late American political campaign just closed, I LIKE ESSIG.

Let me now switch from the sublime to the practical---the question (and I hope it may continue as a question---for the sake of stability) affecting some possible change in the society's traditional seal. Although the writer privately uses script characters for ten and for eleven as different from $\mathcal{X}$ and $\mathcal{E}$ as are Essig's upsidedown 2 and 7---and I respect everyone's right to experiment and to advocate---yet I hesitate to overthrow our traditional characters and for a simple reason which I will now state.

In order to attain stability---and in order to avoid the sad look of one who has lost it in the darkness of the closet or out in the blinding barrenness of the desert--we must, I believe, hopefully cling to our landmarks with the tenacity of persons dedicated to progress and to an ideal. Those two characters are no more than a means to an end, they are the language by which we understand each other in this interesting game of restoration of the dozenal base to its rightful position, and any other two characters upon which considerate persons might agree would equally serve a like purpose. But a dozen years of our literature upon the subject---and there will never be a harder twelve years---are written in that language, understood in that language by diverse persons, and our progress to date is based upon that simple understanding. The Duodecimal Society of America will, perhaps, have no reason to exist when everyone is familiar with the duodecimal base. Nothing yet leads us to believe that this will obtain within a dozen-dozen years. But when it does come to pass, let our language for that period be as uniform and as dead as Latin today is uniform and dead---it will merely have passed into the immortality of greatness and goodness.

Having a great respect for history, and recognizing the difficulty of establishing true history, I do suggest---if any alteration whatever be considered a must---that we do no more than place a halo of ancient Roman numerals about the outer periphery of our present seal, each adjacent to its more modern duodecimal digit. This will serve two purposes. It may furnish archeologists a dozen-dozen-dozen or twice that many years hence with a bridge upon which to cross to enable them to read from a cornerstone the year of this era in which men built a magnificent pile of stone and marble---perhaps the building housing the United States Supreme Court, the President, the Senators' offices. Secondly, and more immediately, it may furnish a bridge by which some will pass from the present into that world of dozenal doings, the world of tomorrow, the world of base twelve.

The stone of Conopus is not yet 3000 years of age, and what a happy bridge it furnished back to Egyptian hieroglyphics! A simple seal cast in bronze, no doubt to be called by our posterity

"the brass of Staten Island", might thus furnish the steppingstone in arithmetical progress from Roman numerals, through the numerals of the Indies and the Arabs, to duodecimal digits foreseen by the Divinity out of all time. And do not overlook the possibility that we might go through the valley of death before duodecimals rise to that glory.

These two characters may be given different names by numerous nations and persons in nations, but let the characters stand for what they stand in all places and nations, ten and eleven, dix et onze, etc and etc. The ten is a simple reiteration of the Roman historical character which always in recorded time represented ten. It is present on all typewriters. It can be placed on all dozenal adding machines. The eleven is simply an errested somersault of the 3 character, an upsidedown 3, even as nine is an upsidedown six, easily indicated by a capital E on a typewriter. It is much the same in appearance whether the 3 be rotated about a vertical or a horizontal axis. True, the uninitiated will call the ten "ex" and the eleven "ee", but at least will not stammer and cough and choke. And those in the know always will say, here, now, we have ten things or eleven articles, or dix or onze, or dek or el---certainly no duodecimalist will doubt their number, and that, for the society, is the only important fact.

EXCERPT FROM A LETTER TO THE EDITOR

by Group Captain G. Struan Marshall, Edinburgh

Knowing how strongly I believe in the dodecane principle, my friend, Professor A. C. Aitken, D.Sc, F.R.S., has lent me the Duodecimal Bulletin for July, 1956, and I have read it with great interest. I have long felt it most unfortunate that just because biology contains so many groups of five, culminating in the digits of the vertebrate hand and foot, we should be condemned for ever to the narrow restriction of a numerical system based upon a multiple admitting of only one common fraction; the common fractions being half, third and quarter, with the secondary addition of half a third, or sixth, for five is a purely artificial aliquot.

I have said 'condemned for ever'; this may seem to be a shocking thing to say, for it would deny the ultimate success of your Society, yet I fear the decimal system is so deeply rooted all over the world, even in China, as to make its replacement a utopian dream.

I wonder however whether you might accept an argument in favour of dodecanism: that the decimal scale is all very well for those who *must* use their fingers to count in dozens because twelve is the *only* multiple of comparable size that allows of the common fractions being expressed by a single digit.

The Indians made computation practicable some 2,000 years ago by the invention of the sunya (= empty) or zero, to indicate the empty row of the abacus, but just because this was the dawn of practical arithmetic (for the Romans were almost helpless with fractions) they did not appreciate the importance of simple symbolic representation of the common fractions, and so very naturally took the ten digits of their counting-machine, the hands, as their basic numerical group.

We in Britain are constantly being sneered at by the Continentals (Europeans other than ourselves) for our addiction to the dodecane in shillings and pence, feet and inches, but we have extensions of the dodecane principle that few of them know of: the standard English submultiple of the inch is the line, one-twelfth of an inch; and horses are measured (as to height at the withers) in 'hands' each of four inches.

THE 1957 ANNUAL MEETING

The coming Annual Meeting of the Duodecimal Society of America will be held Thursday, February 14th, 1957, at the Gramercy Park Hotel, Lexington Avenue and 21st St., New York City, at 8:30 P.M.

A recent amendment to our constitution authorized the selection of any date prior to June 1st for the meeting, and the date of February 14th was chosen to avoid conflicting commitments and to escape the congestion of the period of the mid-years examinations.

Apart from the routine matters of reports and elections, the feature of the meeting will be a paper from Jean Essig, author of "Douze Notre Dix Futur".

Friends of the Society, as well as the members, are most cordially invited to attend.

WANT AD

WANTED: Men and women between the ages of 15 and 150 with at least one eye, one arm, and something between the ears as well as under the diaphragm, - who would like to put some meaning into their lives, and who will enlist one-twelfth of their spare time in technical assistance in freeing mankind from its long slavery to the ten-base.

The Duodecimal Society needs help in carrying on its dissemination of information and literature among the peoples of the world on the advantages of the dozen-base, and in maintaining liaison with those who realize the necessity for integrating our numbers and measures.

Write to Ralph H. Beard, 20 Carlton Place, Staten Island 4, N. Y., who will advise on how to escape boredom how to influence people, and what to do with your money.