
THE DOZENAL REVIEW

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The Official Journal of the Duodecimal Society of Great Britain
(incorporating the Duodecimal Association)

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Cuttings from papers about Metrication will be found on pages 9, 10, 18 to 19, 26 and 29.

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155 Leighton Avenue, Leigh-on-Sea, Essex.

President: Sir Iain Moncreiffe of that Ilk.

Secretary: Shaun Ferguson, 69 Scotby Road, Scotby, Carlisle CA4 8BG

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Editorial

This copy of the Review should have appeared last Winter; I hope you will feel it has been worth while waiting for. It has been produced by a different process this time; your comments on the results will be most gratefully received! Metrication running riot, the latest idiocy is:

DECIMALISED TIME

Metricists have always maintained, rightly of course, that their socially inept set of units are incomplete without the inclusion of angular measurement in their mindless set of rules that make no allowance for practicalities and common experience. Only by the deliberate avoidance of its geometrical properties can the divisions of a circle be matched in abstract obscurity to those of a straight line.

Time, as a recurrent circular measure, is not sacrosanct. The use we make of the clock-face with its readily visualised parts of the hour and day that can be assimilated at a glance seems so well established that its defence should be unnecessary despite occasional murmurings in apparently responsible journals.

The Canadian Metric Association has now put forward proposals for a decimal clock complete with etymology for 'hours', 'minutes' and 'seconds': chrona, decichrona and millichrona (the latter of 8.64 seconds)..... Know your enemy! The 'rema' of 0.864 second should, as a basic SI unit, be resented by the Metric world since it will change the value of all units derived from time - but professional change-makers should, by now, be making plans for their own continued employment.

Any member wishing to examine the paper sent out by the Canadian Metric Association can apply to the Information Secretary (6½p postage) for an abbreviated version; 14p will bring you the full story. The diagram on the leaflet should be sufficient deterrent alone, and well illustrates the intended abandonment of facilities provided by a dozenal scale since the dawn of civilisation.

The public should be made aware of this further attempt to restrict their freedom of thought and action by the destruction of the patterns whereby we have most effectively organised our affairs. Technical rationalisation has its political objectives. If traditions and knowledge of the past can be eliminated then the future can be manipulated without undue fuss.

MILLENNIUM

A new section. SF

Millennium - or ideas for the year 2000. The idea of such a section in the Review was suggested some time ago by Louis Loynes. He felt that we should have a place for ideas that should be made ready for the year 2000.

Contributions and ideas should be sent to the Secretary at 69 Scotby Road, Scotby, Carlisle, Cumbria, CA4 8BG.

A recurrent theme of those who see the need for reform is the question of the Calendar. We have in the past published several ideas on Calendar reform, and I have received new ideas recently which we have not yet given in the Review.

In its simplest form, the Calendar should have a fixed pattern, with Leap-Year Days fitting in neatly. For example, here is the Calendar proposed by the World Calendar Assn.: (Notation dozenal...)

January	February	March
April	May	June
July	August	September
October	November	December
S M T W T F S	S M T W T F S	S M T W T F S
1 2 3 4 5 6 7	. . . 1 2 3 4	 1 2
8 9 10 11 12	5 6 7 8 9 10	3 4 5 6 7 8 9
13 14 15 16 17 18 19	10 11 12 13 14 15 16	10 11 12 13 14
17 18 20 21 22 23 24	17 18 19 20 21	15 16 17 18 19 20
25 26 27 . . .	22 23 24 25 26 . .	20 21 22 23 24 25 26

An extra day is added after December *26 every year, and this is called World-day.

In leap-years an extra day is added after June *26.

Each quarter of the year has *77 days, and each quarter starts on Sunday and ends on Saturday. The year starts on Sunday and ends on Saturday.

CRAFTSMAN'S MEASURES IN PREHISTORIC TIMESA.F. Whillock

The above is the title of a little-known work worth bringing to the attention of anyone interested in measurement. The author describes his examination of thousands of artifacts - flint arrow and axe heads, bronze ornaments and cult objects - to find that their major dimensions were multiples of one or two definite distances, to a degree beyond the possibility of mere chance. These distances he defined as Alpha and Beta units, and these, he suggested, were the half 'inches' of two different types of foot measure in common use and which are still to be found in pockets of resistance to bureaucratic uniformity. He presumes a class of craftsmen disciplined to employ certain standards of length considered sacred. In classical and mediæval times national standards were kept and issued by priests in temples and ecclesiastical centres.

The Alpha unit of 0.619 inches is represented by the Braccio d'Ara and Bologna foot of 14.9 ins. The Egyptian Xylon was 100 Alpha units and the French Aune was 5 Alpha feet. The pre-captivity cubit, used for boat-building in case of floods, was 36 Alpha units. The Braccio, or arm-length, is mainly Italian by location as well as name. The Canton foot, still obtainable and used by craftsmen in Hong Kong, is 14.7 inches (decimally divided into thumb lengths). The Braccio, which has a wide range of variations, could have been similarly subdivided.

The Beta unit of 0.553 inches fits into Flinders Northern foot of 13.2 inches. This is the old English and Scottish builders foot. Also the Chinese Ch'ih and the old Moscow foot before Peter the Great worked in the shipyards at Deptford. 36 Beta units formed the post-captivity cubit, suggesting that it is the more recent.

The northern foot is a more accurate and stable unit, stated by Skinner (2) to have originated in India: 5 wheat grains of 0.264 inches (unchanged by 5000 years of selective cultivation) to the first major division, with 10 to the foot. This unit was also a third of the Sumerian double-cubit which was divided, by their sexagesimal system, into 60 Su-si or fingers. It was carried by the migrations from Central Asia into both China and Northern Europe where it became the Pied-du-Roi of Paris.

Our own foot, with a smaller 9" version, is from a third derivation (3): the Egyptian digit of 0.74 inches. Two dozen of these formed the profane or engineers' cubit, the forearm length, and 28 (7 being a mystic number) the Royal Cubit for tomb-building and tax-collecting. The half practical cubit became the Greek Pythic foot of 12 digits and the more visually efficient Attic foot of 16 digits was adopted by the Romans to be divided into 12 thumb widths. The original length was thus 11.82 ins., virtually the metric building module of 300 mm, but stabilised by Edward I at 3 barleycorns to the inch. The barley seed has also remained unchanged and could still serve for ordinary purposes.

The Megalithic Yard, defined by Professor Thom as 32.4 ins (4) was likely to have been the natural stride of small stature people. By proportion with our 36" stride the Alpha unit would have been their digit. Perhaps a woman's finger-width, since primitive societies often had a matriarchal form with a Mother Goddess. The Beta unit could be two grains of wheat or barley, held in great respect. Our ancestors were not quite as disorganised as might be supposed. Axe and arrowheads from the flint weapons factory at Brandon in Suffolk have been found all over Britain and Europe, carried along well-defined trade routes. Some sort of Trades Description Act, with reference to acceptable and reproducible standards, was surely in force.

The question is the manner in which the smaller basic units became transposed to the larger. The coincidence of multiples has been shown, however, and man was an inveterate experimenter with his bodily dimensions and food seeds that miraculously reappeared in the same size and shape every year. Any possibilities that

existed would have been discovered and put to good use.

References:

- 1) Craftsmens Measures in Prehistoric Times.
Ludovic W. Mann, Mann Pub, Co.,
183 West George St., Glasgow.
- 2) Weights and Measures: their ancient origins
and development in Great Britain up to 1855.
F.G.Skinner, HMSO, 1967.
- 3) Duodecimal Review, Winter 1975
- 4) (ibid.) Winter 1971.

TWELVES VERSUS TENS

'Dozenist'

The superiority of the dozenal system over the decimal has been established particularly by the late Professor A.C.Aitken, F.R.S., who estimated that dozenals are about one-half (50 percent) faster than decimals.

In France the late Jean Essig, an Inspector-General of Finances, wrote two books in favour of dozenals.

Research is also being done in the USA, where mathematical tables and a circular dozenal slide-rule have been produced.

THE DOZENAL SLIDE-RULE

Mr. Pendlebury, of 19 Edinburgh Avenue, Holt, Norfolk, has constructed with loving care a very comprehensive slide-rule comprising all the usual and un-usual scales plus conversions from twelve to other bases. Negatives have been prepared of this and it is intended to include offset-litho prints in a future issue of the Dozenal Review.

If any reader would like an advance copy it can be obtained direct by application to the Information Secretary at 29 Underhill, Moultsford, Oxon., OX10 9JH. A 6 $\frac{1}{2}$ p stamp will cover UK postage. Superior copies on bromide paper can be supplied at an extra charge of 10p.

The length of scale is the TGM Grafut of 11.641 inches. A sliding frame can be constructed from perspex or other rigid plastic strips secured with a double-sided adhesive tape supplied by Sellotape. This is also suitable for the scales which, in any case, should not suffer a wet adhesive. Practice your aim first: once the tape touches it is on for good! AFW.

IS NOTHING SACRED....?

'Dozenist'

from the 'Good Words' translation of the Bible:

And God said to Noah... build an ark,
133 metres long, ...

so the sacred cubit of the Bible has been replaced by the sacred metre of the Metricists. But in any case the cubit Noah was supposed to have used is a historical unit, and should be left alone. We haven't changed the parable of the talents even though a talent is no longer a currency-unit.

THE BIG STICK

AFW

The Weights and Measures Bill, which is intended to give the Government powers to impose cut-off dates for the use of familiar measurements, has been put forward again. As Patrick Huther said in the Sunday Telegraph for 17.10.1976: the need for compulsion undermines the entire case the Board ("that clumsy, slow and hamfisted body") has made out for a voluntary process.

No country has ever accepted the Metric system voluntarily; it has always been imposed, and native units, usually more satisfying and useful, have always been banned.

The Metric syndrome of inadequate units, rigidity of structure, indivisibility, rejection of culture, indifference to practicalities and social needs, technical arrogance and nympholepsy, is made complete by legal compulsion as a necessary means of ensuring the ascendancy of the artificial methods of dealing with our material environment.

Teachers 'conned' into dropping pounds and pints

4 June '76
"The Teacher"

TEACHERS have been conned into dropping imperial measures in the classroom, Professor Max McGlashan, chairman of the Metrication Board's education committee, said last week.

He was speaking at a press conference called to demonstrate that educationalists were united in condemning the Government's decision to postpone the second reading of the Weights and Measures Bill, virtually the last stage in metricating Britain.

But while the Metrication Board and assorted education experts were denouncing the postponement announced in March, Mr John Fraser, Minister of State for Prices and Consumer Protection, was announcing that the Bill will go ahead after all.

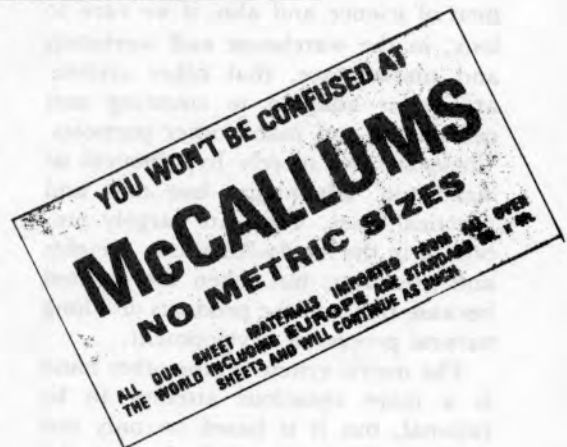
The Bill enables the Government to set "cut-off" dates for

various sections of the retail trade, beyond which trading will have to be done in metric measures. The shop counter is the last area to go metric, and it will be there that the person in the street will feel the full impact of the change, as pounds give way to kilos and pints to litres.

Professor McGlashan and friends said that children were now leaving school who did not know about imperial measures. But instead of going out into a fully metricated world they would find measures they did not understand.

He denied that the children had been let down. Teachers had been led to expect that Britain would be fully metricated by now, and had been encouraged by the Department of Education

to teach just metric measures.



Extract from American Metric Journal, July/August, 1975

TRICKS of the TRADE

FRIENDLY COERCION AND SLICK TRICKS

Pressure and coercing are not entirely foreign in a small nation where the government owns the airlines, the telephone system, postoffice, public transportation and much else controlling the lives of just 13 million people.

The threaded fastener manufacturers said they couldn't support the expense of setting up to manufacture metric threaded bolts because there was no demand. Well, the government created a demand, an artificial one. They mailed out phoney requests for bids to foreign pro-

ducers, for very large quantities of assorted sizes of metric threaded fasteners. The word got back to the little Aussie outfits and they wasted no time getting into the metric nut and bolt business. When asked if this was "cricket" in Australia we were informed it was "moral swasion."

The retailers cannot see a single benefit to conversion. They are resisting in a number of ways. Their advertisements reflect this opposition and so do the signs in the stores.

Metrication: the case against

by Douglas M.C. MacEwan, PhD, FInstP, FRSE and B.A.M. Moon, MSc, AInstP

A fairly general belief exists that only the metric system, which is based on powers of ten is 'scientific'. This is far from the case. There is adequate testimony in the works of outstanding men of science and also, if we care to look, in the warehouse and workshop and marketplace, that other systems are better adapted to counting and calculation and many other purposes. These are not merely hypothetical or 'academic' advantages but real and practical ones. They are largely embodied in the Anglo-American weights and measures, but taken for granted because they are the products of a long natural process of development.

The metric system on the other hand is a more conscious attempt to be rational, but it is based on only one traditional process, and that an inferior one: the practice of counting in tens. That does not make it more 'scientific'. Its wholesale adoption would greatly damage our prospects of advance towards a better system and seriously prejudice development of the simplest method of reckoning and tallying.

The history of weights and measures shows that the Anglo-American system is a product of a long evolution which is not isolated. Essentially similar systems were used all over Europe before the French Revolution. Weights, coinage and liquid measures were based in a very large degree on successive divisibility by two; it was usual to have 16 ozs in a pound and a peck of 16 lbs was also common, though superseded by the stone because this reduced the amount of handling of heavy weights in a balance pan. As a measure of volume the peck is two gallons, i.e. 16 pints.

Likewise, with the exception of the florin—a Victorian attempt at decimalization—all British and Irish coins of recent times have been obtained by successive division by two of the pound, shilling or penny.

This system is not unscientific. Like many other products of a long evolution it is well adapted to its purposes, for example the measuring of household goods. The scientific principle on which it is based, that of uniform divisibility by 2, is the most natural basis for many reckoning purposes. All high-speed computers make use of it, often using it exclusively for calculation, even though the present custom of representing numerical quantities in tens means they must make a conversion of their input and output. The scale of two is superior in spite of the need for this extra work.

The practical merits of the system are of course known to every cook. You take a pound of butter, and you divide it in two. Each portion is a half pound. You divide one of them into two, and you get a quarter-pound; into two again, you get two ounces; into two again and you get an ounce. The ounce is, as every cook knows, a practical and convenient unit of size for everyday weighing and measuring portions of food.

The metric system has no equivalent to the ounce. The gram is absurdly small. The dekagram is hardly ever used as such (partly due to an error in naming). The nearest convenient measure to an ounce is 25 grams. But how, starting with a 'pound' (500 grams) do you get 25 grams? You divide into two: 250 grams; into two again: 125 grams. After that you are stuck. You have to divide into 5: an impossible operation without measuring implements.

Thus the metric system is unsuited to the ordinary measures of the kitchen. However, this sort of measurement is the main purpose of a practical system of weights and measures.

Of course the metric system with its scale-of-ten regularity tends to suit purposes of science (though it is not beyond improvement and scientists do not hesitate to use other units when more convenient for their purpose). Its precedence in science is largely historic—there happened to be a large number of outstanding French scientists in the new sciences, such as electricity, in the era following the Revolution, and science like everything else has its fashions—but the basis for it is the practice of counting on the fingers—the most primitive and not the most efficient method.

Using the fingers we get a base of ten for numbers but this is quite arbitrary. Eight or twelve could be used instead (so could any other number but these are the most viable alternatives). A base of eight (and sometimes sixteen) is frequently used for representing numbers in work associated with computers—it is simply related to the base of two and has the advantage of a much more compact notation. If such a base were used more generally our ounce-pound system, for example, would seem as 'rational' as its metric equivalent.

The Anglo-American system also makes use of the dozen—twelve inches in a foot—twelve hours on the clock face (and other relations as well of course, though their actual use is very slight).

There are sound reasons for the choice of twelve, based on its divisibility by 2, 3, 4 and 6. This means that most common fractions are easier to represent and everyday multiplications are simpler than in a system based on ten whose only factors are 2 and 5. Thus reckoning with a twelve-based currency (shillings and pence) is generally simpler and involves an easier

transaction of coins than any other for small cash transactions (e.g. 3 lbs carrots at 8d. = 2/-; 3 lbs carrots at $3\frac{1}{2}$ d. = 10½p.).

Base twelve is not as compatible with division by two as is base eight, but it is still much more suitable for this purpose than ten. Thus dividing 1 successively by 2 we get:

In base ten:

0.5, 0.25, 0.125, 0.0625 . . . and

In base twelve:

0.6, 0.3, 0.16, 0.09 . . .

The advantage of base twelve is clear.

For tallying and stocktaking base twelve is very much better than base ten. Groups of three or four are particularly useful for rapid counting and particularly simple to use in dozens (e.g. 3, 6, 9, a dozen; 3, 6, 9, two dozen, etc.).

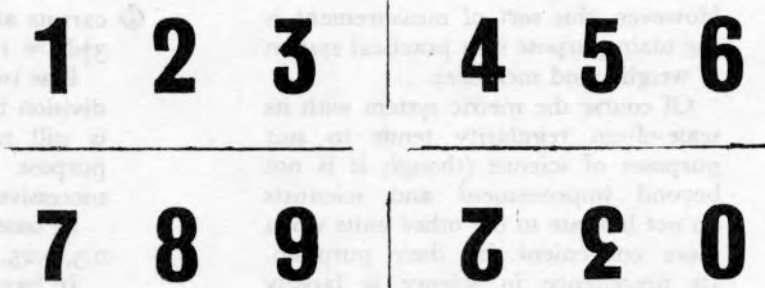
For the same reason, packing in dozens gives much more freedom to choose package shape for economy of materials and ease of handling—which is why it is so common in Britain and America—and far from unknown on the Continent. To abandon it and pack in tens instead, as is sometimes suggested, is retrograde, less efficient and more expensive—and therefore unscientific.

An important feature of the Anglo-American system is not merely that it is practical but that it permits ready development to a more rational scale-of-eight or scale-of-twelve system. It takes more account than any other of the necessities of everyday life. It has been retained in Britain and in America (very sensibly) for everyday affairs while use of the metric system has been permitted for other purposes by those who so wished. Should this excellent arrangement be upset in the name of uniformity? By preserving our existing weights and measures alongside the decimal metric system we keep our options open. As arithmetic in other bases is being increasingly introduced into schools the view of those options of people-at-large will steadily reach a better balance. To

cast our system aside now would be to close those options in a thoroughly undesirable way. In fact, counting by dozens is so sensible that sooner or later it is bound to be 're-discovered' with such impact that, whatever system of weights and measures is in use, it is bound to be affected by it. The better suited to it is our system of weights and measures, the less that upheaval and the greater the consequent advantage to the users of that system.

This advantage is ours if we keep our ounces and pounds, inches and feet, pints and gallons, and we retain a system which has not been bettered for practical everyday purposes.

If metrication is forced upon us, these advantages are lost.



Decimals switch panic move, say scientists

By PERCIVAL BANYARD

A HARD-HITTING attack on the Government for committing Britain to decimalisation has been made by two eminent scientists. They claim that metrication means multi-million pound expenditure and that the decision was a panic one because of the fear that America would go metric first.

In a joint statement Dr Douglas M. C. MacEwan, of the Macaulay Institute, Aberdeen, and Mr B. M. Moon, a director of the computer laboratory, University of Canterbury, Christchurch, New Zealand, at present living in London, say the Government has ignored the basic principles of democracy and good business practice.

They say that, as with the proposals for Common Market membership, no real attempt was made to inform the public of the issues involved although they penetrated deeply into the way of life of everyone.

"Such arbitrary changes are disturbing and demoralising and can do great harm to Britain. We believe there is substantial and justifiable resentment of this situation, though much of it is at present inarticulate through lack of informed discussion.

"An attempt to impose metrication nationally and in

every walk of life by legislation or other means is to impose an unnecessary and unreasonable burden on the people of this country.

"The metric system is a more conscious attempt to be rational but is based on only one traditional process and that an inferior one; the practice of counting in tens.

"This does not make it more scientific and its wholesale adoption would greatly damage our prospects of advance towards a better system and seriously prejudice development of the simplest methods of reckoning and tallying.

They claim that the present American-Anglo system is not only practical but permits ready development to a more rational scale of eight or scale of 12 system.

"By preserving our existing weights and measures alongside the decimal metric system we keep our options open. To cast our system aside now would be to close those options in a thoroughly undesirable way."

'Russian Multiplication' (Part 2)
(and conversion)

N.J.Shaw

(4) Just as a diversion, note what happens when a base two number is repeatedly halved without remainder:

(k) 1011011 The right-hand digits, read upwards, are a repeat of the original number. Hence, if the given number is in binary, to convert to other bases just write it 'backwards downwards' (right-hand digit at the top!), then proceed as before, crossing out doubles opposite 0's and adding those opposite 1's. Example (l):

(1)	(xii)	(vi)	(x)
1	1	1	1
1	2	2	2
0	~~4~~	~~4~~	~~4~~
1	8	12	8
1	14	24	16
0	~~28~~	~~48~~	~~32~~
1	<u>54</u>	<u>144</u>	<u>64</u>
	77	231	91

Before leaving whole-number conversions, look back at example (i) Review *22, p *267.

In the binary bases, the adding process was not necessary. For base two the result 110100 is obtained simply by looking up the first column and writing 1 for a number left in and 0 for a number crossed out.

To further convert to bases four, eight and sixteen, simply regroup in two, three or four digit form and rewrite as single digits; e.g.:
 $110100 = 11/01/00 = 3/1/0 = 310$ (base four);
 $= 110/100 = 6/4 = 64$ (base eight)
 $= 0011/0100 = 3/4 = 34$ (base sixteen).

(5) Conversion of fractionals.

Again, this can be done through the intermediary of binary, the process being similar, except that the halving and doubling are reversed - as in example (m):

(m)

(x)	(xii)	(iv)	(v)
<u>.4375</u>	1	1	1
0 8750	;6	.2	.22222...
1 750	;3	.1	.11111...
1 50	;16	.02	.0303...
1 0	;09	.01	.0124...
	;53	.13	.2043..

Example (m) is a simple case in binary as $\neq 0.4375$ is 0.0111 (binary) exactly. Note again that to convert to another 2^n base the addition is unnecessary; thus 0.0111 (binary) = $0.01/11 = 0.1/3 = 0.13$ (base four). However in the odd base, base 5, the digits all recur and the final answer is 0.2043.

Example (n) shows the next case, in which a simple dozenal fraction 0;5 becomes a recurring bicimal (base 2 fraction):

(n)	(xii)(to compare)
0; 5	1
0 2	;6
1 8	;3
1 4	;16
0 8	;00
1 4	;046
0 8	;023
1 4	;0116
0 8	;0000 ... (total 0;4876 to here)
...	

Obviously, after the first two doublings the 4 and 8 are going to recur in the dozenal column in phase with 1 and 0 in the binary column, so 0;5 is 0.0110 (binary). In base four, from what we have said earlier, this is clearly 0.12. For base sixteen we can rewrite it as $0.0110/1010 = 0.6A$ (where A stands for ten as in the IBM digits A-F for ten to fifteen). For octal we have to write 0.011/010/101/010... until it is clear that we have 0.325.

The next case, example (o) shows a recurring decimal - that old workhorse $1/7 = 0.142857$ - converted to a recurring bicimal:

(o)	.	142857
0		285714
0		571428
1		142856 +1
0		285714
0		571428
1		142857 +1

The check on this example is very simple: binary 0.001 is only a three-digit expansion of octal 0.1, and by the base-1 rule (X) this can only represent $1/(8-1) = 1/7$. Note that only four doublings are necessary, when the re-appearance of 285714 makes it obvious that the repetitions will be infinite.

The things we discover for ourselves, once we get out of the decimal strait-jacket!

X This rule states that for any base b

$$\frac{1}{b-1} = 0.111111... = 0.1$$

for example, $1/9$ in base ten = 0.1111...

$1/8$ in base twelve = 0.1111...

$1/7$ in base eight = 0.1111...

Some comments on helpful patterns like this have been made in previous issues of the Review.

Puzzles

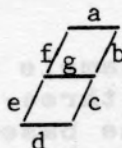
The Fibonacci sequence is the following set of numbers: 1, 1, 2, 3, 5, 8, 11, 19, 22, 47, 75, 100, 175... in which 100 is the only square (that we know of). Are there any others among later terms of the sequence?

A wage-bill of £100 (one hundred) is paid out to 100 employees of a firm. If the men receive £10 each, the women 5s and the boys 2s6d, how is the money paid out and how many boys are there? Similar problem in dozenal: make it *£100, *100 people, and *£10, *£0;30 and *£0;16.

Seven-segmented Light-Emitting Diode Displays T.Pendlebury.

—or, in plain English: Pocket- and Desk-Calculator Numerals.

The numerals on these calculators are combinations of seven short lines:-



If, as I hope, the day will soon arrive when we have a pocket multi-base calculator (at least for the commonest bases, 2, 4, 8, 7, *10 and *14—I call this last Libral), it is important that our digits can be displayed unmistakably by this system.

For the digit 3 I think the best combination is defg, thus 

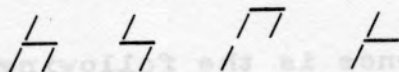
No, don't include the a-stroke. It would make it a perfect E, which is what we don't want. In fact, anyone buying a typewriter with the intention of having the dozenal digits added, would be well advised to consider those founts that have a flat-topped open-tailed 3, so that inverted for elv it looks like this . I try to do my hand-written elvs like that too.

For ten, 7, the nearest combinations I can think of are  or 
(ade or beg). We cannot have  as it is used for 2.

When working in Libral I use the digits and numerals:-

7	5	7	λ	(Etymology: doZEN, LUcKy,
zen	luk	twyven	trive	TWYce seVEN, TREble fIVE)

for which I suggest



Criticism, please!

P.S. The symbol I use for libra is lb, usually as a suffix to indicate the libral system, e.g. 7_{lb}537 read as seven libral five three ten. Should this ever be required on the seven-segment system I suggest 

THE AUSTRALIAN ANTI-METRIC ASSOCIATION.

QFW

We have received a packet of material from this organisation which demonstrates that opposition to 'Metric Madness' is more active down under than with us at present.

Changes are being made on the poorest evidence, carefully selected, and, of course, with no authority or estimate of costs, monetary or cultural. The usual one about trade benefits has been refuted by a high official in the Department of Trade. G. Blainey, Professor of Economic History, considers that the official report has so many omissions and dubious statements that, were it a mining prospectus, the Fraud Squad would be involved! The only difference is that the sum to be 'invested' by the public dwarfs the biggest mining venture. In brief, he doubts if any major change has been adopted on the basis of so much spurious argument and mangled evidence.

The material has a refreshing tang. Australian ethos is, shall we say, more rugged than ours, which brings the subject out into the open compared with the stealthy but ever-so-correct methods of our Metrication Board. One trick was to put out phony tenders for large quantities of metric bolts to foreign competitors, thus scaring Australian manufacturers into tooling up to meet the competition! This kind of official 'moral suasion' is balanced by a resentful public objecting to being pushed around by politicians. Despairing of dinning metric into people's skulls have reverted to announcing their wares in proper units.

The lighter side is represented by the police issuing descriptions of wanted people in centimetres (sic) and kilogrammes. Just the thing for a quick identification. This matches our 865-558-915 ploy (X) to add a bit of interest to the subject. Some odd figures are creeping in as attempts to form useful quantities are made. Sauce bottlers went 'Metric'

X vital statistics ..

with 600ml and 300ml sizes in place of 26oz and 13 oz - a nice 20pc reduction. Attempts are being made to persuade them to change back to 750ml and 375ml but the margin of profit in this will guarantee that it is not on. The great thing about metrication is that it hopefully leads to uniform standards through out the world. When every nation has finished adapting it to their particular needs the result will be more confusion, not less!

The Association at 50 Cardigan Street, Carlton, 3053 has an able President in R.W.Parry, a vice-president S.Murray Smith and Secretary B.Boase. They will welcome any support we can give, moral as well as financial and specifically asked in their covering letter for information on metric conversion in this country. Any correspondence should be sent to Mr. J. Mottram, PO Box 94, Ivanhoe, Victoria 3079.

The interesting aspect is in the reasons why an artificial measuring system is being pushed through with such eagerness despite the great cost and the resentment of ordinary people, for whom it acts as a barrier to the understanding of their material surroundings. One has only to read through the propaganda current in the English-speaking world to realise there is a well-organised technical Mafia at work, determined that measurement will no longer form a support to our freedom of thought and action. They well understand that we can better regulated if all our activities and requirements can be put over a common denominator and thus more readily catalogued and pigeon-holed. In 1984, a fully metricated dystopia that is now nearly upon us, the language was carefully stripped of any words with which criticism of the authorities could be formed.

In the commercial field, setting aside such crudities as the 500ml 'pint' in South Africa and the metric foot of 300mm in Britain, the gramme, millimetre, millilitre and cent are admirably suited to a steady whittling away of quantities and value. It takes a keen eye and a good memory to keep track of the diminishing volume in a packet and its steadily rising price. The ounce, pound, penny and shilling formed definite steps over named barriers which a manufacturer hesitated to cross without good reason.

Inflationary pressure, the main reason for abandoning £sd, is on all the time and requires a facile means of adjustment. The statement 'everything that happens causes prices to rise' is very true but this action actively encourages price rises and oils the mechanism as well. Also, with the suppression of familiar concepts, there are no checks that can be readily applied and the process accelerates beyond control.

Lastly: there is a vested interest in change itself, and change-making is quite a career nowadays. Hierarchies of technicians and clerks pore over conversion tables to issue papers and instructions, all jealously guarding their promotion procedures, pensions and holidays with pay. The annual cost of the Metrication Board in Britain is almost a million pounds, which is a small portion of the total charge we will have to bear. It does, however, demonstrate the effort being made to eliminate methods that have been evolved to suit our physical needs and habits of thought.

Metrication feeds Inflation!

SF

Chancellor: Halfcrown, halfpenny have I banned,
Sixpence, shilling, penny - and
Inflation my achievement crowns -
For soon we'll only need the pounds.

Farthing, guinea, bob and crown,
Groat and noble - put them down;
All old money's out of bounds,
-And soon we'll only need the pounds!
and if it gets worse...

You've heard of China Dollars,
Of Wooden Nickels round;
Our new coin will surpass them all -
The aluminium pound!

18

The world may not go metric

By PROFESSOR ARTHUR SHENFIELD,
former economic director of the Con-
federation of British Industry.

THE visitor to Australia from Britain or America must be impressed by Australia's great push forward with metrication.

No option is given to the general public to keep the old measures side by side with the new. They must take their kilometres, Celsius degrees, and the rest and nothing else.

Has this thrusting "progress" been wise? I think not.

Overrated

First, take the case of the general public. How do kilograms, litres and metres benefit them? Ease of calculation? Vastly overrated. Can anyone with normal intelligence say that the old measures gave him real trouble?

In fact, it is cogently arguable that they were just right because they stretched our minds, when we were children, just enough to train us in mental arithmetic without overstrain. Of course there were odd measures like

rods, poles or perches, pecks, and Troy ounces, but no ordinary citizen bothered with them.

Furthermore, why after 170 years do the French, the parents of the metric system and the proud champions of logic, still buy groceries in half-kilos and use the "pouce" (our inch) for many household measurements? Because for many purposes the old measures are more convenient.

Consider the thermometer. Of course, scientists long ago adopted Celsius. But for the ordinary man what does the illogic of Fahrenheit's 32 and 212 degrees matter?

The fact is that Fahrenheit is better because the degrees are smaller. For as fine a calibration, in Celsius half degrees are needed.

But the hub of the matter concerns industry, not the ordinary citizen. What is the cost-benefit verdict for industry? The cost is enormous.

In Britain several years ago the cost was thought to be about £1500 million. You

can be sure that it would be far higher now. The major burden is in engineering.

Allowing for the difference in size between the British and Australian engineering industries, the cost in Australia must still be several hundred million dollars.

What is the benefit? Uniformity with industry in Europe and the rest of the non-English speaking world. Certainly there are substantial savings there.

Advice

But how much depends on what America and Britain do. If they go metric, Australia would be bound to do so. But will they?

My advice is not to be taken in by the huffing and puffing of the British Metrication Board.

I see a groundswell of resistance arising in Britain which will put metrication off to the Greek Kalends.

What is more important is that America has gone even less far than Britain, and

that the benefits to American industry per unit of output are much less than to British industry.

Hence I believe that America will reject the change. If America and Britain do not go metric, by far the greater part of the English-speaking world's industry will remain with the old measures.

The benefit to Australian industry will then be small, and the cost-benefit outcome will be distinctly negative.

It may be thought that Britain's membership of the Common Market demands the change for her. It does not. She has been selling goods to the Continent since the metric system began, without going metric herself.

But have not some British and American industries already gone metric? And does not this mean costly duplication of equipment? Yes, but the cost is less than that of going wholly metric, the benefits of which do not go up with the cost.

With regret I conclude that it is a pity that Australia has decided to be a front-runner in the metric race. This is a case where holding back behind the leaders would pay off.

DIE POTUS-LIEFERWEISE



Jede Lieferung geschieht **ohne Nachnahme**, mittels Rechnung!

Die genannten Preise verstehen sich jeweils inklusive Getränkesteuer (wie auf der Preisliste angegeben) und vorbehaltlich einer Änderung, zuzüglich Alkoholversteuer. Einsatz 1 Lt. 2,-, 2 Lt. 4,-.

Die Zahlung kann nach Ihrer Wahl entweder innerhalb von 8 Tagen (abzüglich 2% Skonto) oder binnen 30 Tagen netto erfolgen (Erfüllungsort ist Wien, Eigentumsvorbehalt bis zur vollen Bezahlung).

Die Bestellung sollte mengenmäßig immer durch 6 teilbar sein (z. B. 12, 18, 24 usw.). Innerhalb dieser — lieferttechnisch bedingten — Verpackungsgröße können Sie frei disponieren und einzelne Flaschen besonderer Sorten bestellen (Spirituosen werden auf Wunsch auch einzeln geliefert!).

Falls Sie einen kleinen „Querschnitt“ durch unsere beliebtesten Sorten wünschen, empfehlen wir die auf der Bestellkarte angeführte, sehr preiswerte „Sechserpackung“.

Potus Ges. m. b. H. Getränkedirektversand
Adresse: 1200 Wien, Nordwestbahnstraße 77
Telefon: 33 11 41 Automat

* **Orders in multiples of 6...
Decimal packing is not very
convenient...**

I'm fed up with this ghastly shambles called metric conversion.

Let me just quote from the last report of the Metric Conversion Board:

"By June 1974 metric conversion in Australia is so well advanced that it is judged to be more than 50 per cent complete and to be well past the point of no return.

"This gratifying situation reflects the enthusiasm with which the opportunities afforded by conversion are being grasped, the leadership being given in the sectors by those involved in planning and implementation and by those for whom they speak and the high level of acceptance of metric conversion as a desirable and worthwhile operation for Australia."

What a load of codswallop.

Loaded down by grammes, awash in a sea of litres, this nation is on a lost and bamboozled cruise in a bureaucratic sea littered with meaningless new words like tonnes, hectares and millibars.

They're the easy ones.

Quickly, class... tell me what a Kelvin is? Or a Decitex? Or a Gi? galitre?

Or come on a simple Saturday morning shopping expedition with me and see how enthusiasm grips you as you grasp the opportunities afforded by conversion.

Hardware

First stop at the service station. Remember to buy your petrol by the litre instead of the gallon and be careful the lad understands to put in half a litre of oil instead of a pint.

And ask him how many kilopascals he's putting in the front tyres.

I do hope he remembers that 175 kilopascals equals 25 lb per square inch.

Stop at the hardware shop. You want some 3 in. by 9 gauge nails?

Well, remember to ask for 75 mm by 3.75 mm now.

And there's no point in asking for half a gallon of paint. It's now one litre (1¼ pints) or four litres (7 pints).

But of course you're a dab hand at working out how many litres of paint you need to cover so many hundred

To heck with hectares ... AND METRES ARE DEFEATERS

square centimetres of wall space, aren't you?

I could go on... about mum trying to work out how many of those new metric skeins of wool she'll need for the kid's jumper — a new skein weighs 25 grammes — ten per cent less than the old measure.

Or that really she should be asking for a 680 gramme loaf of bread.

Which stays the same weight as a 1½ pounder.

But that butter won't be sold by the pound — or equivalent size — anymore.

That the size will be reduced from one pound (454 grammes) to 375 grammes (13¼ ozs.).

The big question is WHY?

Since the Metric Conversion Act became law on June 12, 1970, the metrification of Australia has developed into a two-sided monster.

On the one hand you have the Metric Conversion Board, with some 36 (three dozen) souls aboard spreading pamphlets throughout the land, crowing success and warning darkness. "It's too late to turn back."

On the other hand you have a growing ground swell of public opinion, sick of being confused and sick of being ripped off by profiteers, people crying: Enough!

Heading the opposition is the Australian Anti-Metric Association with headquarters at 50 Cardigan Street, Carlton.

Its president is Bob Parry, a chartered accountant, who has been crusading against metrification since 1966. It's secretary is solicitor Bob Boase, whose anti-metric zeal goes back to about the same date.

Once upon a time their two voices were just crying in the wilderness of public apathy.

But not any more.

The association now has 300 paid up members, an executive of eight and its office bearers are now stumping the country spreading the anti-metric message to eager audiences.

They've been distributing petition forms too, to be sent to Federal Parliament.

Since November, 10,000 people have prayed as follows:

That the plan to obliterate the traditional weights and measures of this country is causing and will cause widespread inconvenience, confusion, expense and distress.

That there is no certainty that any significant benefits or indeed any benefits at all will follow the use of the new weights and measures.

That the traditional weights and measures are eminently satisfactory.

Repealed

That the Metric Conversion Act be repealed, and that the Government take urgent steps to cause the traditional and familiar units to be restored to those areas where the greatest inconvenience and distress are occurring, that is to say in meteorology, in road distances, in sport, in the building and allied trades, in the printing trade and in retail trade.

Bob Parry and Bob Boase told me that the Metric Conversion Board has divided the metrification of Australia into 144 tasks and claims that 100 of these tasks have been completed, and thus it is too late to turn back.

"We say that while 100 tasks may have been officially launched, a great many have run aground," they said.

They rattled off examples... structural

steel that was to have been measured metrically being switched back again because Europe had adopted imperial standards... land being offered in acres instead of hectares... green grocers refusing to sell other than in pounds or dozen lots.

Bob Parry says that his Association estimates that metric conversion will cost the nation \$2,500 million. He estimates that we've spent only — only — \$500 million on the "tasks" so far.

"The board won't say how much the job will cost. They won't debate the matter. They won't reply to questions," he said.

"What we want is really simple — let's go back to pre-1970 when any section of the community that wanted to go metric could do so.

"Let's get rid of this compulsion to make us all metric."

Bob Boase said: "We want an end to the Metric Conversion Board. While it exists there will be this pressure to convert.

"Let us have a moratorium — let's have a fresh look at the board's 'tasks' — let's work out if — and why — they are really necessary.

Fraction

"It is not too late to stop. Sure there will be difficulties, but the cost of going back will be a fraction of the cost of going on with this thing."

"Metrification is really a step backwards," said Bob Parry, "take milk for example. It's going to cost \$750,000 for the milk industry to go metric in Victoria.

"And the industry says the result will be the price of milk up and a sales loss of a million gallons a year because milk will be sold in litre containers

"Look," he said, "if you woke up tomorrow morning and the fella on the ABC said 'It's going to be 90 deg. today — everybody'd know where they were — and who'd be complaining?'"

Damned if I know. Do you?

A short postscript... I'm told there was a seminar on computer technology in town not so long ago and a visiting expert told the gathering that computers were now not working in units of ten anymore. For some advanced mathematical reason the base units were now eight and 16.

"Anybody who thinks decimals now is thinking B.C.," said the expert.

B.C. standing for Before Computers.

Anybody for converting to octaves?



Like many thousands of other people I applaud R. W. Parry's article, "Metrics Wasteful". (B, January 3). Perhaps it is not possible to turn back the clock, but as least why can't we, for the time being, halt any further change to metrics? There has never been any need for "all the way with metrics". Admittedly certain aspects of the metric system are desirable, but then imperial measurements have certain benefits also. Why not adopt the best of both worlds?

In retrospect, for example, there was no benefit at all in the change Fahrenheit to Celsius. Both scales are purely relative. But Fahrenheit has the more expanded scale. Rain recording — the now discarded "points" measurement is more meaningful than mm. One mm is equal to approximately 4 points. Retention of points would simply mean that 100 points equals 25.4 mm.

The exasperation of carpenters having to cope with the minute divisions on a metric rule, and ordering 3 x 2 timber as 75 x 50 — which is smaller, by the way.

Certain words disappear from our vocabulary — mileage, acreage, gallonage. Why the new word tonnes (two extra letters) when the difference between the metric and the imperial ton is only 16 kg. A man might be described as 6 feet tall and weighing 10 stone. In future this becomes 182.88 centimetres and weight 63.502 kg. Stupid, isn't it?

But let us look to the future. Petrol pumps are to be changed from gallons to litres at a cost of some millions of dollars. Next tyre pressures are to be changed from pounds per square inch to kilo pascals (whatever that means), so 10,000 tyre pressure gauges are scrapped.

Imagine the confusion facing people on a strict diet, mostly elderly, having to convert the all important "calories" to — what is the term — kilo joules! Why, for heaven's sake, why?

Why was a bunch of academics given carte blanche approval to introduce metrics? Academics whose limited intelligence is confined to the very narrow scope of their particular training, but who are incapable of weighing up the economic advantages against the fantastic costs and disruption involved.

There is, right now, a very real need to halt any further change to metrics until the benefits can be fully assessed.

PERCY LOVETT
Avalon Beach NSW

THE BULLETIN, JANUARY 17, 1976

Metriation — In line with Government metrication plans, all quantities delivered, and associated prices etc., will be quoted in Metric quantities from 1st January 1976. The conversion factor is 1 gallon = 4.545 96 litres. 1p per gallon is approximately equal to 0.22p per litre. Resellers of paraffin (and of motor fuels) may continue to sell in gallons.

**HOT
OR COLD**



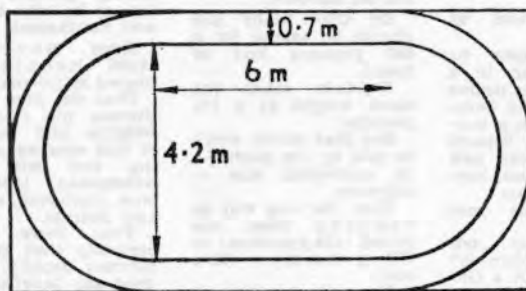
THIS'LL TELL YOU

INEXPENSIVE 2½" Dial thermometer Double Calibrated in fahrenheit so we understand it.

Centigrade to keep up with metrication. Useful anywhere — greenhouse too. Stands or hangs. Saves fuel.

£1.10 Ref: 176
plus 10p p & p.

6.



GCE
Oxford
Summer '74

Fig. 2

Fig. 2 represents a rectangular plot of land. The central portion is a lawn. It is a rectangle, 4.2 m by 6 m, with semi-circles at its shorter sides. The lawn is surrounded by a path of width 0.7 m. The four remaining corner pieces of the plot are flower beds. Calculate

- the total area of the plot,
- the area of the lawn,
- the area of the path,
- the area of one of the flower beds.

LOAD NUMBER	READING AT FINISH GALLS	10ths
3 5 3 X	2 0 4 4 6 0 1	
3 5 2 X	2 0 4 2 6 2 1	
PREVIOUS LOAD NUMBER	RE	
LITRES GALLONS DELIVERED 900.	FACTOR USED IS 4.54596 PURPOSES. THE CONVERSION LITRES FOR ACCOUNTING HAS BEEN CONVERTED TO SHOWN ON THIS TICKET THE METRED QUANTITY	
RECEIVED DELIVERY B. Thompson		
DELIVERY REFUSED		
TANK CONTENTS	GALLONS	
AMOUNT IN TANK		

Customers are requested to read the conditions of sale printed on reverse which became effective 1/1/73.

AREAS OF Disagreement...

Piece of leather 50cm² (20in. sq) to be used suede side out
 Fibre-tipped pen
 Tacking cotton
 Bag of leather pieces, not less than 6.5cm² (2½in. sq) to be used leather side out (from craft shops)
 Sewing cotton to match
 5m of lurex cord and chenille or carpet needle (from The Needlewoman, 146 Regent St, London W1)
 Translucent thread (e.g. Peri-Lusta)
 Mirror tile 30cm² (12in. sq)

20 in sq or sq in??
 1 sq.in = 6.45 sq cm.
 20 in square = 50 cm square₂
 But 50 cm. sq. is not 50 cm²!

"The cost to Britain: 400 hospitals or 8,000 schools"

Despite claims that the changeover to the metric system will bring Britain untold economic advantages, the Government has never been prepared to make any kind of cost-effectiveness study of the change.

Indeed, the Ministry of Technology's view has consistently been that, apart from the admission that it will cost £1½ - 2 million to alter the speed limit signs, it is impossible to estimate how much the change will actually cost the nation - since it is impossible to estimate its economic benefits. "There can be no question of compensation," said Mr Wedgwood Benn on July 26, 1968. "The costs of adopting metric weights must lie where they fall."

Is it possible to make any kind of guess at the cost? Taking only a few of the items which will eventually have to be changed and paid for, it is possible to make at least a rough minimum estimate.

Even allowing for natural depreciation and replacement, industry alone will be involved in the very considerable expense of replacing or adapting almost all its precision machinery and machine tools - lathes, presses, moulds, forms, bottling and packaging machines etc... say, eventually, £2,500 - £3,500 million. Particular industries will be involved in their own extra expenses, i.e.

the brewing industry, which will have to replace eventually more than 40 million glasses, barrels, bottling plant, optics for measuring spirits etc. ... say (according to the estimate of the Brewers' Society themselves) £100 million.

More than 20 million scientific and mathematical textbooks will have to be revised or replaced ... say £20 - £30 million.

Several million new signposts and signboards on Britain's roads ... say £20 - £30 million.

Replacement or adaptation of all bathroom, kitchen, shop and industrial scales and weighing machines, scientific instruments, tape measures, rulers, petrol pumps, etc. ... say £200 - £300 million.

All in all, it is hard to avoid the conclusion (short of obtaining any more reliable figures from the Government or industries concerned) that over five or ten years of rising costs the total bill to the nation will be at least somewhere in the region of £4,000 - £5,000 million - that is to say, more than half the Government's annual expenditure, and five times as much as this year's forecast trade surplus.

The cost is enough to provide 400 major hospitals or 8,000 schools.

4. The dozen should, wherever possible, be avoided in metric packaging. Egg cartons in Canada now have a 2 x 6 configuration; to change that to a 2 x 5 pattern should be a simple matter. Bottles might be boxed in a 2 x 5 or 4 x 5 lay-out; or, a staggered 3 - 2 - 3 - 2 pattern could be a practical alternative to the traditional 3 x 4 arrangement.

It should be obvious that, for pricing purposes, round decimal quantities of 10, 100 and 1000 are more practical than the dozen or the gross (12 x 12).

Where size variations occur despite grading (as with oranges), pricing by weight (or what the purists call mass) would be more equitable than the present system of charging by the dozen.

5. Modular coordination in packaging is perhaps most advanced in Sweden. Individual packages have been designed to fit into the packaging module of 400 x 600 mm, and into the preferred pallet size of 800 x 1200 mm. The ultimate aim is to coordinate the entire chain of modules with a standard overseas freight container. The major stumbling block at the international level seems to be the non-metric American road allowance width limitation. Even if the metric system is adopted in the United States, it may take another ten years before an ideal solution is found. Therefore, modular coordination in packaging might best be disregarded in Canada for the time being.

Text and lay-out by
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Albert J. Mettler
Canadian Metric Association,
P.O. Box 35,
Fonthill, Ontario L0S 1E0
Canada

January 1974

Metric Fact
Sheet No. 8

The Guardian, 24/3/76
(England)

Metric Bill put back

FACED with the possibility of defeat, the Government has pigeon-holed for the time being a Bill which would have speeded metrication in Britain.

In the Commons there was ironic laughter yesterday when the Leader of the House, Mr Edward Short, announced a change of business for Thursday to allow "more consultation" on the Weights and Measures Bill, which was scheduled for second reading.

We have done Time. We have also done Length, Area and Volume. Now let us combine these to investigate Velocity, Acceleration, Flow, etc.

In decimal:- 44 feet per second = 30 mph.

10 metres per second = 36 km h^{-1}

1 foot per second = 3600 ft/hr.

Firstly, there are various ways of representing the division notion "per". The use of the letter "p" is irregular: we have mph, fps, fpm, etc., but in psi (pounds per square inch) the p stands for lb! The oblique / is handy for simple expressions, but when several units are involved, parentheses may also be necessary: (kg/m)s, kilogrammes per metre multiplied by seconds, but kg/(m s) kilogrammes per metre per second.

The form: 36 km h^{-1} is called the index form. It is the recommended form in the metric system SI to which the world is converting. Its advantage is that each index refers only to the particular unit to which it is attached. Those with a minus sign are denominators, those without are numerators. If this seems strange to you have a good look at the following:-

$2^3 \quad 2^2 \quad 2^1 \quad 2^0 \quad 2^{-1} \quad 2^{-2} \quad 2^{-3} \quad 2^{-4}$ etc

8 4 2 1 1/2 1/4 1/8 1/14 etc. Every time we subtract one from the index the effect is to divide

the power by the root, in this case 2. As the indices run into the negative, the powers run into fractions. (kg/m)s now becomes $\text{kg m}^{-1}\text{s}$, and kg/(m s) becomes $\text{kg m}^{-1}\text{s}^{-1}$.

We shall use the index form in this series of articles, and for dozenal expressions all unit abbreviations shall start with a capital letter so that they can be run together without spaces, e.g. FtHr⁻¹, Feet per Hour.

When using the Hour as a unit of time, Feet or Metres are for most purposes required by the thousand. That is why traditional systems of metrology use the second as their basic time unit. They are:-

FPS, Foot-pound-second

cgse, centimetre-gramme-second (electrostatic) } ...both obsolescent.
cgsm, , , , (electromagnetic)

MKS, Metre-kilogramme-second, now evolved into SI (Système Internationale)
THE Metric System now being adopted throughout the world.

For the same practical reasons a dozenal system of metrology requires a small time unit. The quedriHour = 0;21 seconds (0.17361) has been found by independent researchers to be ideal. It has been renamed the TIM to remove the prefix quedri-, for it is desirable that a foundation unit should not itself incorporate complications. (In SI mistakes of decimal place can easily arise because units are derived from the kilogramme and the litre is based on the cubic decimetre.)

In previous articles we found the hour useful for counting weeks, months, years. To convert to the scientific cum engineering TIMS just add four noughts, or use the prefixes: 1 Leap Year = *5100 Hour, = *5100 0000 Tm or 5;1 sevaTim. As simple as that! [In seconds and decimal 1 Lp Yr = 31 622 400.]

Example 1: A car roadwheel's radius is 1 Ft. When it is turning at 1 rev per Tim, what is the speed of the car in, (a) Feet per Tim, (b) Feet per Hour, (c) quedraFeet per Hour? [$\pi = 3;1848$].

(a) In one revolution distance travelled equals the circumference of the roadwheel = $1 \text{ Ft} \times 2\pi = 6;3494 \text{ Ft}$. So speed of car is $\frac{6;3494 \text{ FtTm}^{-1}}{1 \text{ Tm}} = 6;3494 \text{ FtTm}^{-1}$. (b) For the Hour we move the zenimal point four places to the right: $*6 3494 \text{ FtHr}^{-1}$, which is for (c) $6;3494^4 \text{ FtHr}^{-1}$ (quadraFeet per Hour).

Now, for comparison, we do it in traditional systems for 1 rev per sec:-

(a) $2\pi = 6.283 \text{ fps}$. (b) $6.283 \times 3600 = 22 619 \text{ ft/hr}$. (c) $22 619 \div 5280 = 4.284 \text{ mph}$.
In metric [$r = 0.5\text{m}$]:- (a) $\pi \text{ m s}^{-1} = 3.1416 \text{ m s}^{-1}$. (b) $\pi \times 3600 = 11 309.76 \text{ m h}^{-1}$.
(c) $11.309 76 \text{ km h}^{-1}$.

We now see why it is simpler to use Tims and dozens than seconds and tens.

1 Tim is just over a sixth of a second. Four gross Tims = a hundred secs.

Problem (1): A car travels $8\frac{3}{4}$ miles in $0;3 \text{ Hr}$. What is its average speed in (a) mph, (b) FtHr^{-1} , and (c) FtTm^{-1} ? [Assume a mile = three trinaFeet. Answers are at end of this article].

"Average" does not mean same all the way. Starting from standstill, it had to accelerate, then over-run your answer, and finally decelerate.

To change velocity takes time. The quicker the change, the greater the acceleration. Its units are velocity units divided once more by time units: Feet per second per second, metres per second per second, mph per second. This last is usually expressed as say 0 to 40 mph in 6 sec. The others, by ft/sec^2 , m s^{-2} . In dozenal we have Feet per Tim per Tim, abbreviated FtTm^{-2} .

Deceleration is considered negative acceleration. Expressed by the same units, but with a negative sign in front. Deceleration 3 FtTm^{-2} = acceleration -3 FtTm^{-2} .

Example 2: A car travels at two Feet per Tim at a certain instant. Twozen-six Tims later its velocity is zen Feet per Tim. What is the average acceleration?

$$\frac{*10 \text{ FtTm}^{-1} - 2 \text{ FtTm}^{-1}}{*26 \text{ Tm}} = \frac{8 \text{ FtTm}^{-1}}{*26 \text{ Tm}} = 0;4 \text{ FtTm}^{-2} (= \text{about } \frac{1}{3} \text{ ft/sec}^2).$$

Formulae: In working out the logic of problems, engineers use single letters of the alphabet to replace wordy phrases. These can be manipulated algebraically. The following are generally accepted forms:-

u for initial velocity. v for final velocity. t for period of time.

s for distance or displacement. a for acceleration. a_{av} for average a.

The logic used in Example 2 can now be stated by the formula:

$$a_{av} = \frac{v - u}{t}$$

Example 3: If the acceleration in Example 2 was uniform throughout, i.e. $0;4 \text{ FtTm}^{-2}$, what was the average speed?

$$v_{av} = \frac{u + v}{2} = \frac{2 + *10}{2} = 7 \text{ FtTm}^{-1}$$

Example 4: What distance was covered in Example 3?

$$\text{Distance} = \text{time} \times \text{velocity} = t v_{av} = *26 \text{ Tm} \times 7 \text{ FtTm}^{-1} = *156 \text{ Ft}.$$

(Note that Tm^{-1} and Tm cancel each other when multiplied).

With foot on throttle you select your acceleration though it is nigh impossible to judge how many feet or metres per second per second or per Tim per Tim it is. You feel a pushing from the back of the seat, or, for deceleration, an inclination towards the windscreen. But there is a fixed acceleration

with which we are all familiar.

Throw up a ball and catch it again. You have to wait for it to come down in its own good time. To get it back sooner DON'T hurry, but throw gently. Throw hard, it goes higher, takes longer, but comes down faster in the end. This fixed acceleration is called "acceleration due to gravity", abbreviation g.

Of course feathers and leaves flutter down while bricks and lead weights go plomp. This is due to air resistance. In a vacuum, feathers, leaves and lead weights all go plomp. This is the true g. In air, if we restrict ourselves to cricket balls, bowlers' woods, or high-divers coming down head first, we get a pretty true picture of acceleration g.

$g = -9.80665 \text{ m s}^{-2} = -32.1741 \text{ ft/sec}^2$. To get this in Tims we multiply by 0.17361^2 , which is 0.0301408 , giving:-

$g = -0.29558 \text{ mTm}^{-2} = -0.96975 \text{ FtTm}^{-2}$, which in dozenal is:-

$g = -0;36692 \text{ mTm}^{-2} = -0;\text{E}7789 \text{ FtTm}^{-2}$, a short foot, just under 30 cm per Tim per Tim. (The minus sign indicates that the acceleration is downwards).

All these figures represent the one same unalterable g. Whatever system is used, decimal, dozenal, metres, feet, yards, seconds, Tims, or anything else, g has to be defined. It is the link between the mass and the weight of anything (as we shall see in the next article). It is cardinal to any system of measures. The fact that in m s^{-2} it is approx. ten compared with the thirty-two of the foot-sec system is considered as "one up" to metric. In dozenal it is even better, for it is close to one (never mind zen) foot per Tim per Tim. Why not go better still and let the shortened foot be the actual "foot" of the dozenal system,—the unit of length?

The decision is yours: whether, in dozenal, to stick to Feet and Yards or even Metres, or not. Feet and Yards are at present becoming legally obsolete; the Metre is meshed in gear with decimal counting. The dozen remains always the real dominant of counting, no matter what base is used. In dozenal, the shorter, Gravity-foot is an unobliterable reality. Feet, Yards, Metres and decimal counting are arbitrary choices by mankind. The dozen and the gravity-foot are natural common denominators.

The Gravity-foot has for usage been shortened to Grafut, abbreviation Gf. Using it we have:-

Unit velocity of 1 GfTm^{-1} is 3.8 mph, a steady walking pace, and

Unit acceleration of 1 GfTm^{-2} is g, the acceleration due to gravity (at Earth's surface in vacuum) or the rate of falling, norms that we are all acquainted with.

The acceleration unit is also called the GEE, abbrev. G. You have heard this term in commentaries on space travel. The velocity unit has been called VLOS for short, abbrev Vl, a form sometimes handier than GfTm^{-1} . It is obvious that GfTm^{-1} , 2GfTm^{-1} , 3GfTm^{-1} , 4GfTm^{-1} , 5GfTm^{-1} , etc are all one Vlos. 3GfTm^{-1} , 4GfTm^{-1} , 2GfTm^{-1} , 1GfTm^{-1} are one dunaVlos, Vl . (Subtract the prefixes: $3 - 1$, $4 - 2$, etc = 2).

Upwards distances, velocities and accelerations are positive.

Example 5: A stone is thrown up vertically leaving the thrower's hand at a height of 4;6 Grafut and a velocity of 4 Grafut per Tim. (a) How long before it starts to descend? (b) How high will it rise? (c) At what time (from throw-up) will its velocity be -1 Grafut per Tim?

(a) $u = 4 \text{ Vl}$. v (for start of descent) = 0. Acceleration = $g = -1\text{G}$.

Since $a = \frac{v - u}{t}$ it follows that $t = \frac{v - u}{a} = \frac{0 - 4}{-1} \cdot \frac{GfTm^{-1}}{GfTm^{-2}} = 4 Tm$.

(b) $s = tv_{av} = \frac{t(u + v)}{2} = \frac{4(4 + 0)}{2} \cdot Tm(GfTm^{-1}) = 8 Gf$, to which must be added the 4;6 Gf initial height. Answer: 10;6 Gf.

(c) $u = 4 Vl$. $v = -1 Vl$. $a = -1G$. $t = \frac{v - u}{a} = \frac{-1 - 4}{-1} \cdot \frac{GfTm^{-1}}{GfTm^{-2}} = 5 Tm$.

These are done fully to show: (i) how formulæ resolve into numbers, and (ii) how units themselves cancel out to give the final unit required. In (a) and (c) dividing both numerator and denominator by $GfTm^{-1}$ leaves Tm^{-1} in denominator, which is the same as Tm as a numerator. The result is a unit of time, and time is what we sought,—a useful check. Had the result been Gf, the formula used must have been wrong or wrong units used to start with.

For comparison, here is the same problem done in traditional units:—
Rounded off for fairness: $u = 17 ft/sec$, about $7 m s^{-1}$. $g = 28;2 ft/sec^2$, $9;98 m s^{-2}$.

(a) $t = \frac{0 - 17}{-28;2} \cdot \frac{ft/sec}{ft/sec^2} = 0;826 sec$ or $t = \frac{0 - 7}{-9;98} \cdot \frac{m s^{-1}}{m s^{-2}} = 0;867 s$

(b) $s = \frac{0;826(17 - 0)}{2} \cdot sec(ft/sec) = 7;636$ or $\frac{0;867(7 - 0)}{2} \cdot s(m s^{-1}) = 2;588 m$.

(c) $t = \frac{-28;2 - 17}{-28;2} \cdot \frac{ft/sec}{ft/sec^2} = 1;826 sec$ or $\frac{-9;98 - 7}{-9;98} \cdot \frac{m s^{-1}}{m s^{-2}} = 1;867 s$

(Discrepancies between metric and foot-second systems are due to rounding-off).

Problem (2): A car travels past a certain point A at 5 Vl (about 28 ft/sec or 19 mph). At another point B, 3 trinaGrafut further along the road (about 1 mile) it is travelling at 8 Vl (about 61 ft/sec or 42 mph). (a) What is the average velocity of the car? (b) How long before it passes point B? (c) What is the acceleration? (Assume acceleration is uniform throughout).

Formulæ: $v_{av} = \frac{u + v}{2}$ $t = \frac{s}{v_{av}}$ $a = \frac{v - u}{t}$

Problem (3): A diver leaves the diving board with an upward velocity of 3 Vlos. He enters the water 9 Tim later. (a) What time expires before he starts to descend? (b) How high above the springboard does he rise before starting to fall? (c) What is his velocity on entering the water? (d) What height above the water is the springboard?

Formulæ: (a) $t = \frac{v - u}{a}$, $v = 0$, $u = 3 Vl$, $a = -1G$. (b) $s = \frac{t(v + u)}{2}$, $t =$ answer to (a). (c) $v = u + at$, $t = 9 Tm$. (d) $s = \frac{t(v + u)}{2}$, $t = 9 Tm$, $v =$ answer to (c).

This article has shown how units of length, time, etc are not completely separable entities, but have to work together. If the elementary units are chosen arbitrarily, this can cause complications in an important link-up such as the law of gravity,—and others. To make these links simple, and then let the elementary units devolve from them, can lead to a more efficient system of measures.

In the next article we shall see how gravity forges other links: between volume and mass, and between mass and force.

Answers: (1)(a) $8;9 \div 0;3 = 28 mph$. (b) $28 \times 3 = 84 trinaFoot$ per Hour = $8;9 4FtHr^{-1}$. (c) $8;9 FtTm^{-1}$.

(2)(a) $5 + 8/2 = 8 Vl$. (b) $3000/8 = 375 Tm$. (c) $8 - 5/460 = 1/90 = 0;014 G$.

(3)(a) $0 - 3/-1 = 3 Tm$. (b) $3(0 + 3)/2 = 4;5 Gf$. (c) $3 + (-1 \times 9) = -6 Vl$.

(d) $9((-6 + 3)/2) = -11;5 Gf$.

Enter Demon King, pursued by a recurring decimal... SF

Inch and foot and ounce and ton,
See them vanish, one by one;
Pound and yard and rod and stone,
Not one will I leave alone!

Gill and pint and perch and pole
Out I cast them from my soul;
Gallon, bushel, acre, mile,
See my maniac metric smile!

Furlong, chain and quarter and
Hundredweight and point and hand,
Knot and bable, fathom, clove,
Not a scruple left, by Jove!

Drachm and minim, chaldron, sack
To my Metric Gods I pack,
Pennyweight and grain and peck
Cast I from around my neck!

Pint and Gallon, Quart and Tun,
I will banish, one by one;
League and cable, last and wey;
What next? Ten hours to a day!

Audience: Leave our perches, poles and rods,
 We'll not obey your metric gods;
 Don't pinch our inch, it is so neat;
 And keep your great hands off our feet!

It wouldn't be so bad if Metrication were really just
a pantomime.

THEY call it amelioration,
WE feel it is damnation,
Decimaniac escalation,
Escalating metrication!

How hot is hot? from 'Tomorrow's World'
 who requested metric
 mnemonics....

If Centigrade confuse you,
(As very well it might),
Nine-fifths of C plus thirty-two
Will give you Fahrenheit.

These are the kind where the steps get bigger as the sizes get bigger. A typical example is doubling up and halving down:-

;0116 ;023 ;046 ;09 ;16 ;3 ;6 1 2 4 8 14 28 54 78 194 368 714

or in decimal:-

.007816.01563.03125.0625 .125 ,25 .5 1 2 4 8 16 32 64 128 256 512 1024

In practice this decimal scale is simplified, firstly, by knocking a little off the higher integers and adding a little to the smaller fractions so as to make the digits match up, e.g. 64 and .0625 both become 63, and secondly, telescoping: by shift of decimal place allowing the same sets of digits to be used in every order of magnitude. This gives the series:-

10 12.5 16 20 25 32 40 50 63 80 Ten numbers, ratio approx 4:5. Scale (A)

The same treatment of the dozenal scale gives:-

10 11;6 14 16 19 20 23 28 30 36 40 46 53 60 70 80 90 76 Scale (B)

Onezen-six numbers, ratio approx 7:8. The spectrum is wider, for *10 to *100 in decimal is 12 to 144.

Because ten is two times five, Scale (A) accommodates these factors rather than others, which is probably why the electronics industry produced the following stock scale for resistors and capacitors:-

10 11 12 13 15 16 18 20 22 24 27 30 33 36 39 43 47 51 56 62 68 75 82 91 (C)

Those underlined are the first preference, a coarse scale by increments of approx fifty per cent. It excludes 20, 30 and 51, but includes 47!! Maximal versatility with a minimum of storage bins is the aim. Two ten-ohm resistors in series equals one twenty-ohm, two fifteens, one thirty, etc. Those under-dotted are second preference, giving a medium scale (incl. first pref) of twenty per cent steps. Designers should avoid the others except when absolutely necessary.

A coarser dozenal scale is obtained from (B) by alternate terms:-

10 14 19 23 30 40 53 70 90 Nine numbers, approx ratio 3:4 Scale (D)

and a very useful set: *14 is 4^2 or 2^4 and 0;14 is one ninth. *19 = 7×3 , is one over 5×4 and one under 2×8 , 0;19 is close to one seventh. *23 is three cubed. Then we get 3, 4, 7 and 9. And *53 is 7×9 , and one under 8^2 , 4^3 or 2^6 .

And we must not forget that adding noughts on creates more-factorable numbers in dozenal than in decimal:-

One thousand, †1000, *6E4, has onezen-two (fourteen) factors,

Two to the tenth, †1024, *714, has nine factors,

Seven gross, †1008, *700, has twozen-four (twenty eight). More than the others put together, and it lies between them. Seven gross is the dominant in this region of counting; the thousand, and two to the tenth are its satellites,— and this is true no matter what system you use for counting.

I suggest that the Dozenal Movement should make Scale (B) the Authentic scale for this kind of application, with first preferences as underlined:-

10 11;6 14 16 19 20 23 28 30 36 40 46 53 60 70 80 90 76

As the culprit who evolved TGM may I reply to A.S.Lawler's letter in the Review No 27:-

I, too, started with the foot (and yard), and did not forsake them willingly. I was most disappointed on finding that the gravity foot came out smaller than the statute one, and I could not alter Earth's gravity to make it fit. I evolved parallel systems to see where they led. They led to many other highways: units of length based on speed of light, pendulum, Great Circle, permittivity and permeability of space, etc.etc. The gravity foot was the best compromise between all requirements.

Most of this happened before I had heard of the D.S.G.B. and the D.S.A. I wonder how it was that Prof. Valevsky in Brasil came up with a metric system almost identical to TGM, when he and I didn't even know of each other's existence?! Then there was William S. Crosby in his "Uncial Jottings" in the American Bulletin, doing something very similar but with 2 tim as his time unit.

In using a measuring system what matters most is the actual physical values. The purpose of words is, or should be, to evoke and distinguish ideas. The same word used for two or more values is ambiguous unless we append other words or symbols to indicate which we mean. Since "furlong" is accepted as meaning one eighth of a statute mile, we must say "furlong (dom)" for the dometric unit. Even then, there is nothing to tell us that it is only five-eighths of the other furlong. In conversion from furlongs (stat) to furlongs (dom) and all the other units (stat) to their counterparts (dom) the "(stat)"s and the "(dom)"s become a pestilential rash! I call the furlong (dom) a "dunayard" which tells me that it is a dozen dozen yards.

Use of words like "pole" and "perch" gives the impression that the dozenal movement is a backward-looking non-progressive society. People jump to the conclusion that we stand for counting in five-and-a-halves and that sort of thing! I agree that unnecessary new words should be jetisoned. Cads, Karls, Quans and Palms are new to me and I can never remember which is which. HesiYard, triniYard, duniYard and zeniYard is what I call them. The prefixes and the word "yard" tell me what values they represent. Using prefixes we need only one word for all the units of length in a system, one for all the units of mass, etc.

We are going decimetric, like it or not. I do not oppose this move for the following reasons:-

- (1) To make dozenal live, data galore have to be converted into it, and the vast majority of that data is at present in one of the decimetric systems.
- (2) Conversion from one system and one only is more than enough on our plate.
- (3) Change to the decimetric system does not run away from TGM, but in many ways towards it. Our telephone directories in future will be metric size A4, which is TGM size E (297 mm x 210 mm = 1 x 0;86 Gf), TGM paper sizes are already established. A Maths teacher tells me that students find 2mm graph paper easier to work with than 1mmmm, the duniGrafut is 2.05mm. 5 grammes = 4 quedriMaz almost precisely. The zenaSurf is closer to the sq m than the Surf is to the sq foot, and so on, and so on. The system of Jean Essig (a very thorough an brilliant project) resembles the metric in words, but TGM is much closer in real values.

In answer to Dozenist (Review 27): G to equal 1 for the foot and the tim? Many kilometres below sea level, even at the Poles!!

Sea-level gravity at Poles =	1;003774 G(TGM)	Polar radius	724 9389 Gf
,, ,, ,, ,, Equator	0;88693	Equat. ,,	728 3227
Difference	0;009144		3 5731 Gf
Statute foot	1;045 Gf	=	21.476 km
	1;0038		
Difference	0;0411		

A variation in distance from centre of Earth of 21.5 km causes only 0;009 change of G, which means roughly another 100 km further down for the extra 0;04 !! Lots of matter overhead pulling you up, and of no Earthly use as a Standard for a metrological system. You would have to define G by giving the Grafut in feet: 0;8782 feet per tim per tim, further from 1 foot than the decimal 9.80665 is from 10 metres.

Go ahead! Work out a complete metric system on that idea. You will eventually find out why I finally gave it up years ago in favour of the Gf. Derived units involving L^3 , L^4 and L^5 differ tremendously from the TGM units.

But just to please you: the Moon's Equator is 1;045 sevaGrafut, which equals 1 sevaFoot (Do-mo-mo-foot in Dometric language). I can't win them all! On map of Moon, 30° of latitude or long. at equat. = 1 hesaFoot.

* * * * *

Why not call the Review "The Dozen"?

For sale: Portable Typewriter Olympia SM5, equipped with the digits 7 and 8 and other mathematical symbols. Tabulator, 6 variable positions. Half-spacing both line and letter. Done good service for the Society including the booklet TGM. Good working order, but $\pm$ key has tendency to stick. Recently reconditioned. Keyboard:-

* " / @ £ ¤ ' () £ +
1 2 3 4 5 6 7 8 9 0 7 =

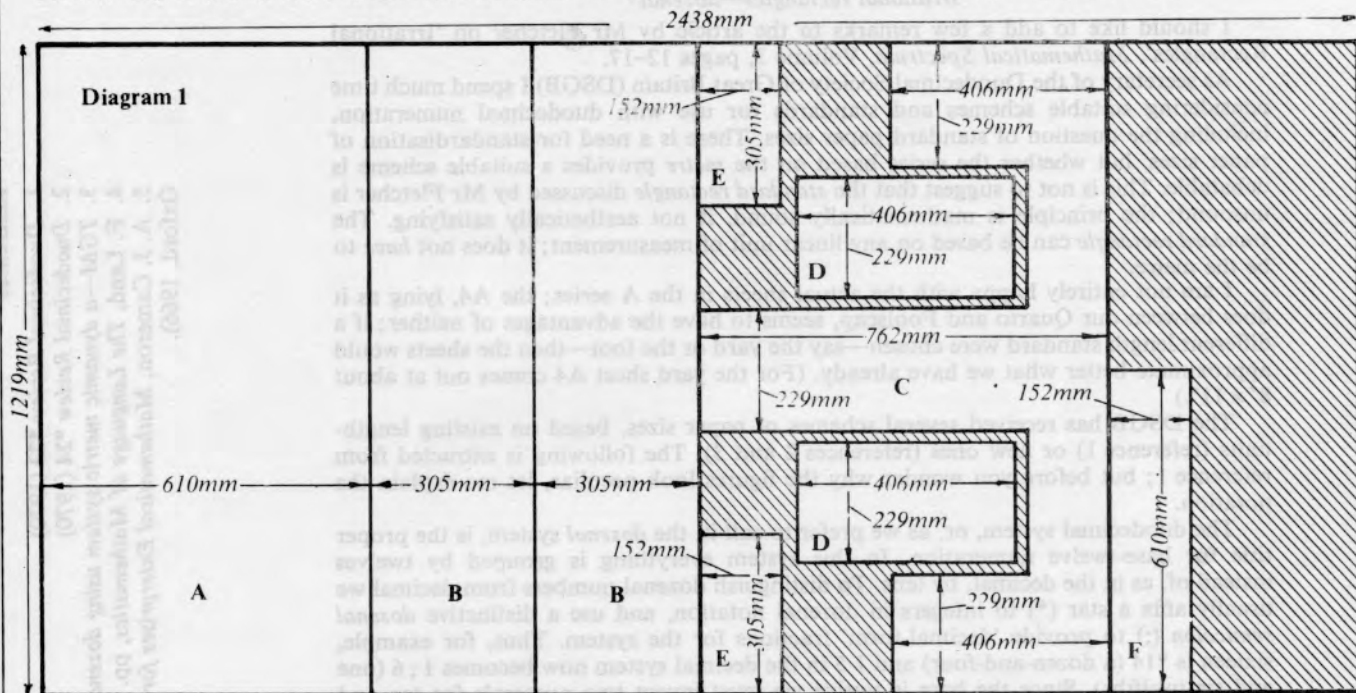
Q W E R T Y U I O P ?
q w e r t y u i o p -

A S D F G H J K L : ω
a s d f g h j k l ; π

Z X C V B N M , . Δ
z x c v b n m , . δ

Complete in carrying case, lock and key. Price: Three dozen pounds excluding transport. T. Pendlebury, 19 Edinburgh Road, HOLT, Norfolk, NR25 6SL.

HOW TO CUT OUT AND ASSEMBLE THE FOLDING TABLE AND BENCHES



Layout allows extra wood for wastage, experienced carpenters can use less

Diagram 2

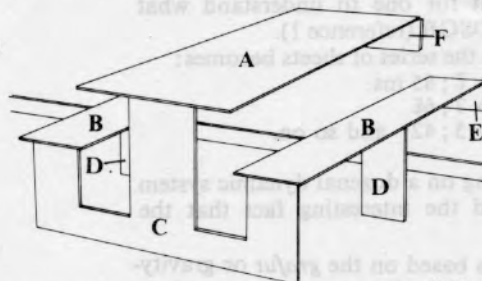
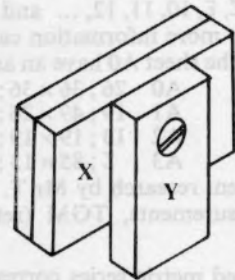


Diagram 3



How the pieces fit together (second piece E not in view)

WOMANCRAFT
NOV '75

Wall-mounted block of catch is double thickness

KEY to diagram:

for 1219 mm read 4'

610	2'	(*40"
305	1'	(*20"
152	6"	(*10"
2438	8'	(*80"
406	1' 4"	(*14"
229	9"	(*9"
762	2' 6"	(*26"

A similar key, applied to the recipes in most magazines, will convert long-winded metric numbers to shorter, simpler Imperial ones.

Dear Editor,

Irrational rectangles—dozenal

I should like to add a few remarks to the article by Mr Fletcher on 'Irrational Rectangles', *Mathematical Spectrum*, Volume 3, pages 12–17.

As secretary of the Duodecimal Society of Great Britain (DSGB) I spend much time considering suitable schemes and standards for use with duodecimal numeration, including the question of standard paper sizes. There is a need for standardisation of paper sizes, but whether the series based on the *metre* provides a suitable scheme is debatable. This is not to suggest that the *standard rectangle* discussed by Mr Fletcher is unsound; the principle is mathematically sound, if not aesthetically satisfying. The *standard rectangle* can be based on any linear unit of measurement; it does not *have* to be the *metre*.

I am not entirely happy with the actual sheets in the A series; the A4, lying as it does between our Quarto and Foolscap, seems to have the advantages of neither; if a different length standard were chosen—say the yard or the foot—then the sheets would approximate better what we have already. (For the yard sheet A4 comes out at about $8'' \times 11''$.)

The DSGB has received several schemes of paper sizes, based on existing length-units (reference 1) or new ones (references 2 and 3). The following is extracted from reference 1; but before you wonder why the figures look peculiar, let me explain the notation.

The duodecimal system, or, as we prefer to call it, the *dozenal* system, is the proper title for base-twelve numeration. In this system everything is grouped by twelves instead of, as in the decimal, by tens. To distinguish dozenal numbers from decimal we usually affix a star (*) to integers in dozenal notation, and use a distinctive *dozenal semicolon* (;) to provide 'decimal-form' fractions for the system. Thus, for example, sixteen is *14 (a dozen-and-four) and 1.5 in the decimal system now becomes 1;6 (one and six-twelfths). Since the base is twelve we must invent two numerals for ten and eleven; we have chosen 7 for ten and 8 for eleven. Our first integers are 1, 2, 3, 4, 5, 6, 7, 8, 9, 7, 8, 10, 11, 12, ... and so on. This is sufficient for one to understand what follows; more information can be obtained from the DSGB (reference 1).

Let the sheet A0 have an area of 1 square yard. Then the series of sheets becomes:

A0	26;36 × 36;96 ins.	A4	7;68 × 7;85 ins.
A1	19;49 × 26;36	A5	5;42 × 7;68
A2	13;19 × 19;49	A6	3;95 × 5;42 and so on.
A3	7;85 × 13;19		

Recent research by Mr T. Pendlebury, while working on a dozenal dynamic system of measurements, TGM (reference 3), has uncovered the interesting fact that the

proposed metric series corresponds to a dozenal series based on the *grafut* or gravity-foot of his TGM (reference 2). The metric A series, already discussed, corresponds to his B series, and vice versa. The B series, by the way, has a width of 1 metre, length of $\sqrt{2}$ metre for sheet B0. For a yard system sheet B0 would be 1 yard by $\sqrt{2}$ yard, i.e., $1 \times 1;48792 \dots$ yds, say $1 \times 1;5$ or $30;0 \times 42;8$ ins.

Mr Fletcher also mentions the *Golden Rectangle*, traditionally the most satisfying and pleasing to look at. It has often been asserted that there is much common sense in our traditional measures and it is therefore interesting to note that many of our present paper sizes approximate to Golden Rectangles (reference 1). But whereas the standard rectangle can be halved and halved again and preserve its proportions (very useful for enlarging and reducing pictures for printing), a Golden Rectangle cannot be halved to produce another, but it can be quartered to do so (reference 1).

The Golden Rectangle is a rectangle such that, given w for width, h for height, $w/h = h/(w+h)$. In dozenals, taking h as 1, $w = 0;75$ (to two places), and taking w as 1, $h = 1;75$. The Golden Rectangle is associated with the *Golden Section* which is featured in many paintings (references 4 and 5).

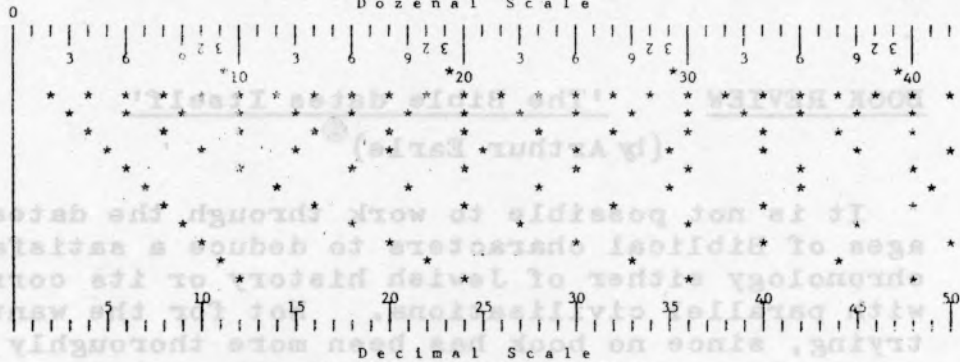
I hope these remarks will be of interest to your readers. And, having implied that the *metre* is not quite as perfect as many would have us believe, should any reader care to write to us to defend it, we will be delighted to hear from him.

Yours sincerely,
S. FERGUSON
(Secretary DSGB)

References

1. *Duodecimal Review* *23 (1970)
2. *Duodecimal Review* *24 (1970)
3. TGM—a dynamic metric system using dozenals (DSGB, 1971).
4. F. Land, *The Language of Mathematics*, pp. 222–223 (John Murray, London, 1960).
5. A. J. Cameron, *Mathematical Enterprises for Schools*, pp. 170–173 (Pergamon Press, Oxford, 1966).

Application
Weighing or
Marking-off
In
Twos
Threes
Fours
Fives
Sixes
Sevens
Eights
Nines
Tens
Elevens
Twelves



The Decimal Scale shown here is the sort you find on all scales of the metric system, whether it be millimetres, centimetres, or grammes and kilogrammes on weighing scales, voltmeters, etc. The diagram shows that even in the simplest of applications the major marks for fives and tens tend to be shunned and by-passed. The most commonly required are short ones especially the dozens and half-dozens. Five is only 1-star but six is 3-star. Ten is 3-star but the dozen is 5-star. Two dozen, three dozen and four dozen are all 6-star. Thirty and forty are 5-star, twenty 4-star, but fifty is only 3-star, twos, threes and fours are again required but the five-tens is shunned. Twenty-five, so apparently important in decimal, is, poor thing, only 1-star. Its next-door neighbour twenty-four is the 6-star two-dozen. In the thirties 2-star thirty-five comes next to 6-star three-dozen.

This sort of incompatibility of the decimal counting goes on and on for numbers greater than twelve. It is there also when working in the abstract without a physical visible scale. Far many more answers to your calculations and in noughts when the number is written—shall we say "spelt"—in dozens instead of tens.

Even in dividing down the Decimal system is clumsy, and out of step:-



↑ indicates coincidence with a dozenal first order mark (twelfths).
↓ indicates coincidence with a decimal first order mark (tenths).
↑ indicates coincidence with a dozenal second order mark (twelfths of twelfths).
↓ indicates coincidence with a decimal second order mark (tenths of tenths).
(Only the main second-order marks are shown on the scales).

Halves are first-order both in decimal and dozenal.
Thirds are non-decimal but first-order dozenal.
Quarters: second-order decimal, first-order dozenal.
Fifths: first-order decimal, non-dozenal.
Sixths: non-decimal, first-order dozenal.
Sevens: non-decimal, non-dozenal.
Eighths, odd-numbered: third-order decimal, second-order dozenal.
Ninths: non-decimal, second-order dozenal.
Tenths: first-order decimal, non-dozenal.
Elevenhs: non-decimal, non-dozenal.
Twelfths: non-decimal, first-order dozenal.

Obviously the dozen is the real "ten" of counting and measurement no matter how we choose to write numbers. Ultimate simplification cannot be achieved without recognition of this fact. Our numbering system must count in dozens not tens. When we say: twelve, twenty-four, thirty-six, forty-eight, etc. we are saying two-and-ten, two tens and four, three tens and six, four tens and eight, etc., 12, 24, 36, 48, not one dozen, two dozen, three dozen, four dozen, *10, *20, *30, *40.

Counting in dozens is quite simple:-

1 2 3 4 5 6 7 8 9 10 11
One, two, three, four, five, six, seven, eight, nine, ten, elv, onezen, onezen-one
*20 twozen, *30 threezen, *40 fourzen, *56 fivezen-six, *66 elvzen-elv, *100 gross.

0.25 the quarter becomes 0;3. 0.75 = 0;9. 0.33333.. becomes 0;4. 0.666.. = 0;8.
0.125 = 0;16. 0.625 = 0;76. 0.1111.. = 0;14. 0.0625 = 0;09. 0.015625 = 0;023.

0.3 x 4 = 1.2 but 0;3 x 4 = 1;0. 0.4 x 3 = 1.2 (a dozen tenths), 0;4 x 3 = 1;0.

Truly it makes sense! Dozens do always dominate

BOOK REVIEW'The Bible dates Itself'AFW

(by Arthur Earle)

It is not possible to work through the dates and ages of Biblical characters to deduce a satisfactory chronology either of Jewish history or its correlation with parallel civilisations. Not for the want of trying, since no book has been more thoroughly and critically studied, but always with the mis-apprehension that counting by tens has been the only method for all time.

Mr. Earle, in a book bursting with facts and ideas, has neatly resolved the discrepancies by discovering that, up to the reign of Ahaz in -741 (Gregorian), the Jews counted in sevens - their number of perfection. Thus, he claims, and the arithmetic is indisputable, errors that have been attributed to carelessness by the old chroniclers are due to the way in which they have been misinterpreted. A simple example is that Jacob told Pharoah he was an hundred and thirty years old when his movements and activities could not extend over more than seventy; now seventy is written as '130' in base seven. Again, "Moses was an hundred twenty years old"... "his eye was not dim nor were his natural forces abated". This is credible if the 'hundred twenty' is '120' base seven or 63 in base ten. Clearly, assumptions that groups of sevens were tens by uncritical decimalists has stretched Hebrew records to cause internal and external contradictions.

The period from the Sojourn in Egypt to the Exodus is much debated (not to mention Magnus Magnusson's doubts about the whole episode). Using the Masoretic text for dating, a close examination of all possibilities starts the Sojourn at the death of Abraham in -1424, which gives Genesis 15, v13-16 historical significance. The promotion of Joseph in -1325 was also the start of the reign of Akenaton, who undertook lavish building projects. He survived the turmoil of those days under the protection of his master Potiphar/Potipherah who usurped the throne as Horemhab after the tragic dissolution of the house of Amenhotep.

With this dating as anchor point, and converting the septenary dates of the Patriarchal era to denary, the birth of Shem, father of all the S(h)emites, is put at -1785 Gregorian which is 1044 years back from the end of base seven counting in -741. Converted to base seven its value is 3021, which is also the date of Ahaz in the Hebrew calendar from their estimation of the time of creation. In a septenary scale, forgotten by its originators and overlooked by their redactors, the start of the Hebrew calendar must be at the time of the Flood and with the birth of Shem. The word 'shem' has a connotation 'zero' as well as 'name' and 'Noah' means 'rest', i.e. a halt to the previous series of impossible longevities - Methuselah and all that. Nothing can be determined about this period, which probably refers to tribal ages and not to those of individuals.

This logical discovery could be dismissed as a coincidence, but Mr. Earle goes on to re-work the details of the chronologies of the Kings of Israel and Judah. A satisfactory correlation between the two converts a plausible theory into a certainty, unless there is a form of Arithmetic in which two plus two does not equal four.

'The Bible Dates Itself' is printed privately in America and so cannot be obtained easily through the usual channels. The reviewer is, indirectly, in touch with the Author and is prepared to organise a supply for cost plus postage (£4.50 inclusive).

Conversion

To convert numbers written in one base or radix to another, divide successively by the new base; the remainders, in reverse order, form the number in the new base.

Ex: 1044 (base ten) to base seven:

7	1044		
7	149	r: 1	
7	21	r: 2	
	3	r: 0	

1044 base ten =
 3021 base seven.
