
DSA Newscast

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The official newsletter of the Dozenal Society of America

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TGM: FROM TIME TO LENGTH

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The Dozenal Society of America is a voluntary, nonprofit educational corporation, organized for the conduct of research and education of the public in the use of dozenal (also called duodecimal or base twelve) in calculations, mathematics, weights and measures, and other branches of pure and applied science.

This continues our series on TGM, one of many coherent, dozenal metric systems, begun in Vol. 7, Iss. 1.

1 **A**S WE observed some months ago,
2 the meter is the *sine qua non* of
2 the metric system. TGM, though,
2 starts with a unit of time, and then derives
2 its unit of distance from that. This month,
2 we'll look at *how* that unit of distance is
2 derived, as well as what other units it gets
3 us.

3 Every schoolchild has heard the story
3 of Galileo at the Tower of Pisa. It seems
3 common-sense that heavier objects will fall
3 faster than lighter ones; but when Galileo
3 climbed to the top of the tower and actually
3 tried it, he found that the two objects fall
3 at the same speed. Indeed, their speed even
3 increased at the same rate. This is because
3 of *gravity*.

4 If an object has mass (that is, if it's made
of matter), it is subject to the pull of grav-
ity. All masses are attracted to one another,
depending upon the distance between them
and their relative sizes. Why not use that
universal constant, gravitation, to define
our unit of length?

In one Tim, an object accelerates by a
certain amount; that is, its falling speed in-
creases by a certain amount. The increase
in speed of a falling object during one Tim
is made the unit of *acceleration* (remember
that "acceleration" just means "change in
speed"), and we can derive our unit of length
from that. In one Tim, a falling object's
speed increases by about $\xi \frac{5}{8}$ inches per Tim,
or slightly less than 26 centimeters per Tim.
This gives us our unit of distance: the Gra-
fut, or "gravity foot," abbreviated "Gf".

The unit is, as noted, slightly less than

a standard Anglo-American foot. Three of
them is a little bit more than an inch less
than a meter (0;2789 meters). 3 triquaGrafut
(3000 Gf) is nearly a mile (0;2512 miles), and
2 triquaGrafut is only very slightly more
than a kilometer (1;0319 kilometers). These
are very useful correspondences, though
we'd like be using the triquaGrafut itself
(1000 Gf, 0;3987 miles and 0;616X kilome-
ters) for distances of that scale.

On the smaller side, a printer's point
($\frac{1}{72.27}$ inches) is almost exactly two tricia-
Grafut (0;002 Gf), a pentciaGrafut is only
slightly larger than a micron, and a bicia-
Grafut (0;01 Gf) is nearly exactly 2 millime-
ters long (2;0782 millimeters, to be more
precise).

(Interestingly, the Grafut is also almost
exactly the length of a European-standard
A4 size sheet of paper (an A4 sheet is 1;0078
Gf long). So an A4 sheet of paper makes a
very accurate Grafut ruler).

Obviously, the unit of area is the square
Grafut, or Surf (Sf), and the unit of volume
is the cubic Grafut, or Volm (Vm). A Surf
is very close to a square foot, and an un-
quaSurf (10 Surf) is only a bit larger than a
square meter (1;07 m²). The Volm is, handily
enough, a bit less than a cubic foot (0;2256
ft³), and a bit less than 22 liters (21;2254 L).
Noting that the standard SI unit of volume is
actually the cubic meter (*not* the liter, which
is (approximately) a cubic decimeter), the
Volm is 0;0388 cubic meters, and three of
them is very close to 0;1 cubic meters (0;02
m³). 4 quadciaVolm (0;0004 Vm) is nearly
exactly 5 milliliters, which is nearly exactly
one customary teaspoon; which means that
10 quadciaVolm, or 1 triciaVolm (0;001 Vm)

is almost exactly fifteen milliliters, or one tablespoon.

Indeed, the standard-sized measuring spoons and cups used for cooking and baking in English-speaking countries can be used with TGM without change; the differences are so minor as to be negligible:

Custom.	mL	Vm
0.25 tsp	1.25 mL	1 $\frac{4}{4}$ Vm
0.5 tsp	2.5	2 $\frac{4}{4}$ Vm
1 tsp	5	4 $\frac{4}{4}$ Vm
1 tbp	15	1 $\frac{3}{3}$ Vm
0.25 cp	59	4 $\frac{3}{3}$ Vm
0.33 cp	78.9	5 $\frac{3}{3}$ Vm
0.5 cp	118	8 $\frac{3}{3}$ Vm
1 cp	0.27 L	1;4 $\frac{2}{2}$ Vm

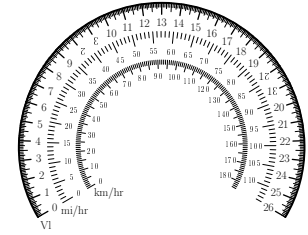
Simply relabelling the spoons and cups will do fine. We did this to make some dozenal tools back in issue 05:06 of this *Newscast*; the exact measurements can be found there.

The Grafut also yields us our unit of speed (or velocity) and of acceleration (which we've already met). One Grafut per

Tim per Tim is our unit of acceleration, called the Gee (G); it is approximately equal to the mean acceleration of gravity while on Earth. As a daily matter, we rarely require units of acceleration; but it's notable that, when we refer to "gee-forces" in TGM, we don't need to multiply by any factor to obtain force in the standard unit: the two are one and the same. (Unless we are having to be *extremely* precise, that is, since gravitational acceleration does vary over the surface of the planet.)

One Grafut per Tim is our unit of speed; it is the Vlos (Vl), and equals about 3;2 miles per hour, or 6;17 kilometers per hour. This is a brisk walking speed. 8 Vlos is very close to 30 miles per hour, and 5 Vlos is very close to 30 kilometers per hour. Our highway speed limit would likely become 18 Vlos (64;2428 miles per hour) or 19 Vlos (68;002miles per hour); that would give us, of course, between about 76. and 80miles per hour, which does approximate actual highway speeds, if not nominal speed limits. A Vlos speedometer, calibrated also in miles per hour and kilometers per hour, is

easy to envision:



Click for Full-size Image

It's also very easy to begin using these units everyday. We've already discussed *Newscast* 05:06, which showed how to build a set of TGM measuring spoons and cups. *Newscast* 05:02 showed how to easily make a TGM ruler. With these, you can use time, distance, and volume in a dozenal way *constantly*, every day; and thus become a dozenalist in practice as well as in principle.

Next month, we'll see weight and mass, and how TGM handles both.

Happy dozens!

The DSA does not endorse any specific system of dozenal weights and measures, of which there are many. We encourage our members to try and explore many of them.

DOZENAL NEWS

SUPERB NEW ANIMATION OF DOZENALS

The Youtube account "Smart by Design" has published an excellent, entertaining, and compelling animation regarding dozenals:

https://www.youtube.com/watch?v=y_QBDrB1bds

Titled "Base 12 - Why Counting In Twelves Would Make Life Easier" not only explains base twelve, but also explains a few of the reasons why base twelve is better. Definitely worth watching, and an ideal resource to which interested new-

comers can be referred.

PLAY DOZENAL CARDS ONLINE!

Paul Rapoport (#230) has commissioned the development of a superb and addictive solitaire card game which works entirely in dozenals!

<https://games.dozenal.ca/pyramid-solitaire/dozenal/>

It has many options for different decks, but by default works with a 50-card deck, similar to our 44-card deck but with added τ and ξ cards for each of four suits. Not only will this help you practice your dozenal

arithmetic, it's a great show-piece for how easy and helpful dozenal really is. Be sure to play a few rounds!

BEAUTIFUL DOZENAL MUSIC

We've already posted about our member Jim Zangerski (#42ξ), for his superb musical setting of dozenal mathematical constants. We've recently become aware of a website, Ancient Melodies, that collects them:

<https://theancientmelodies.com>

These are all very lovely, and it's splendid to watch the videos and see how Jim works the numbers into a melody (the notes

themselves are just the digits in a certain key, since there are twelve semitones in an octave). Go listen for a while, and be amazed!

MUNDEZO ARTICLE ON DOZENS

A short article on dozens, and mentioning one of member Kingsland Camp's many numeral proposals:

<https://www.mundezo.com/en/duodecimal-system>

Not lengthy, but interesting enough, with good graphics, and worth a read.

SOCIETY BUSINESS

VOLUNTEERS NEEDED

As mentioned earlier, the DSA is an all-volunteer organization, and we pay no salaries. As a result, everything that we do comes out of the spare time of our members, time that they have to take away from their families, jobs, or other obligations.

We all love dozenals and enjoy assisting the Society in educating people about them; however, as the Society expands and does more, we find ourselves in need of more help.

Fortunately, the Society has a large membership with a very broad range of professions and experience. If you think you can spare any time or effort for the cause of educating the world about dozenals, please

let us know:

contact@dozenal.org

You can help as much or as little as you'd like. Thank you.

the most basic to the most advanced, from a dozenal perspective, so no question or topic is too easy or too complex. Don't be shy!

OUR NEXT BULLETIN

At our annual meeting in Atlanta last month, we had a splendid preview of the next issue of the *Duodecimal Bulletin*. But there's still space that can be filled! Have an article? A letter containing a question (common or uncommon) you'd like answered? Send them in!

editor@dozenal.org

Remember that our *Bulletin* is designed to cover all aspects of mathematics, from

ANNUAL MEETING

The Board of the Dozenal Society of America has decided to relocate its meeting this year from Atlanta, GA to Boston, MA. This will be our first meeting in the northeast for many years. We have a large number of members in the northeast and hope some of you can join us.

The meeting will be 2 November; the exact location will be determined and announced soon.

POETICAL DIVERSION

WHO STILL HAS LOVE FOR TEN?

Who still has love for ten, our clumsy, wretched foe?
Arithmos's ancient enemy, and counting's bane!
To what fair factors can old Decimal ever go?
In face of Twelve, old hateful Ten must ever wane!
For Twelve is born up by its faithful factor, Two,
who joining with the Six builds up a firm stockade;
and then by Three and Four, who easily can do
all that for which old Decimal needs to beg for aid!
Pale Five can only stand aside and try to weep
in shame for what its lord has never offer made;
and mighty Twelve with all its servants makes Ten fall,
and sweeping all before it, stands up strong and tall!

DONATIONS

Members, please remember that while dues are no longer required for membership, we still rely on the generosity of members to keep the DSA going. Donations of any amount, large or small, are welcome and needed.

A donation of \$16; (\$18.) will procure Subscription membership, and entitles the payer to receive both a digital and a paper copy of the *Bulletin* if requested. Other members will receive only a digital copy. To invoke this privilege, please notify the Editor of

the *Bulletin*, John Volan, at

editor@dozenal.org

As members know, we are a volunteer organization which pays no salaries. As such, every penny you donate goes toward furthering the DSA's goals.

It may be worth considering a monthly donation; say, \$3, or \$6, or whatever seems reasonable to you. This can be set up quite easily with Paypal, which is available at our web site.

Of course, if you prefer to donate by check, you may send them to our worthy Treasurer, Jay Schiffman, payable to the Dozenal Society of America, at:

Jay Schiffman
604-36 South Washington Square, #815
Philadelphia, PA 19106-4115

Remember, too, that the DSA is a 501(c)(3) tax-exempt organization; as such, your contributions may be tax deductible under applicable law.

Thanks again for your assistance; it's your donations that keep the DSA going. We can't keep doing it without you.

FOR SALE

The DSA is pleased to offer the following for sale. These are all either at cost, or the proceeds go to the Society. The exception is *Basic Dozenal Arithmetic*, which is a private production.

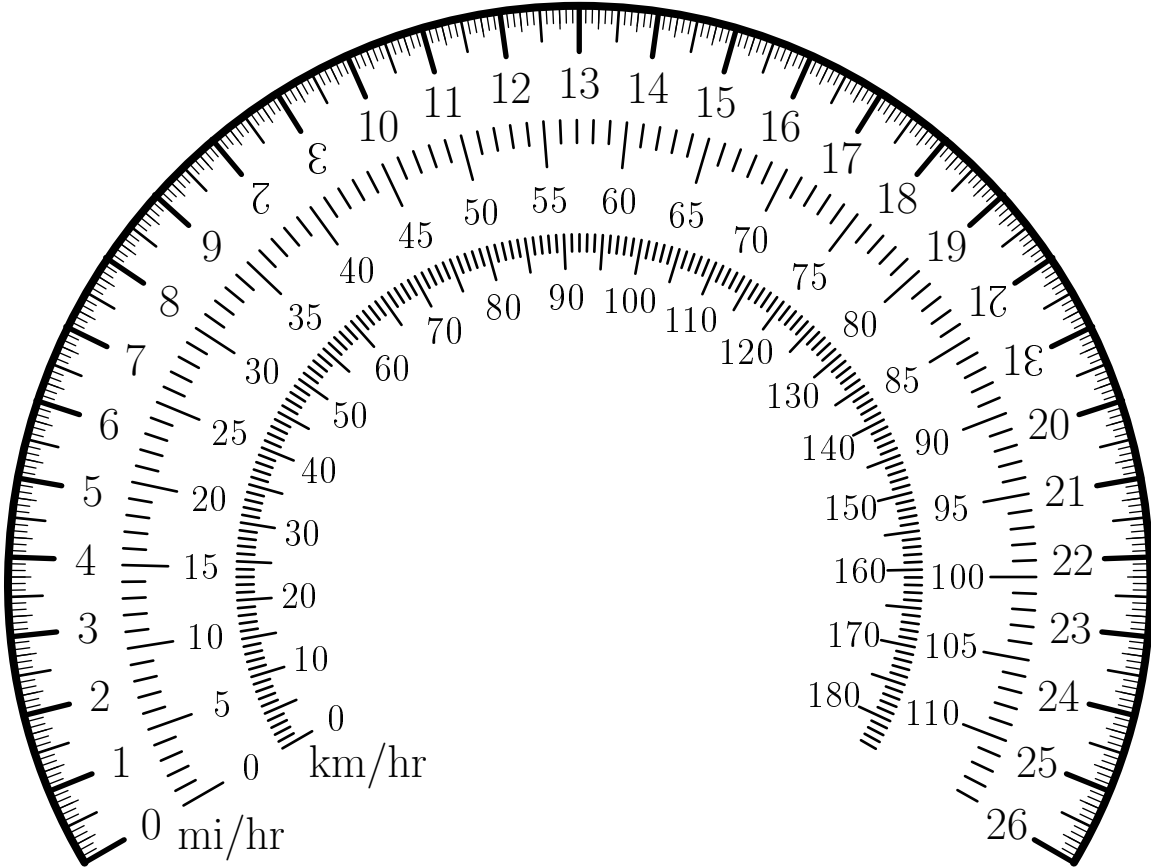
Item	Price (\$)
<i>Dozenal Wall Calendar, 1204</i>	9.05
<i>Dozenal Planning Calendar, 1204</i>	8.32
<i>TGM: A Coherent Dozenal Metrology</i>	8.00
<i>Manual of the Dozenal System</i>	3.46
<i>A Dozenal Primer</i>	4.50
<i>Basic Dozenal Arithmetic</i>	15.00

Prices are, unfortunately but by necessity, in decimal. If for some reason the links above do not work, simply go to: <http://www.lulu.com/shop/shop.ep>

and enter the appropriate terms. E.g., searching for "TGM dozenal" will turn up the TGM book.

We hope to offer other titles, and even some other items (such as dozenal clocks and the like), in the future.

EACH ONE, TEACH ONE



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