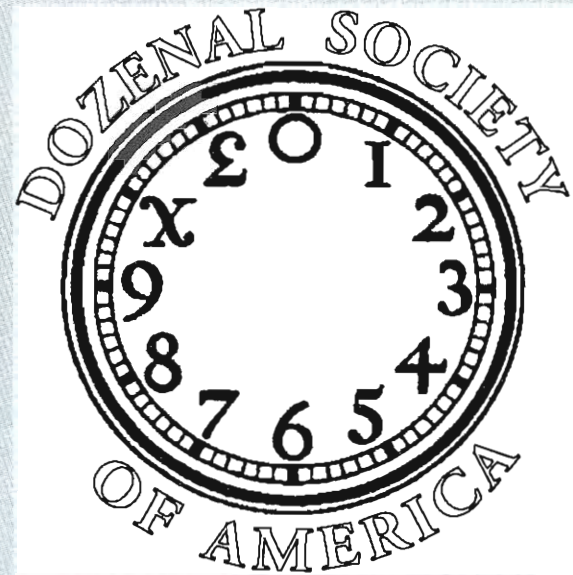


THE DUODECIMAL BULLETIN

The Duodecimal Bulletin



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DSA
THE DOZENAL SOCIETY OF AMERICA
c/o Mathematics Department
Nassau Community College
Garden City, New York 11530-6793

FOUNDED 1160;(1944.)



= Annual Meeting - See page 1X =

THE DOZENAL SOCIETY OF AMERICA

(Formerly: The Duodecimal Society of America)

is a voluntary, non profit, educational corporation, organized for the conduct of research and education of the public in the use of base twelve in numeration, mathematics, weights & measures, & other branches of pure & applied science.

Membership dues are \$12 (US) for one calendar year. Student Membership is \$3 (US) per year, and a life Membership is \$144 (US).

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IN THIS ISSUE

| | |
|--|----------------------|
| PRESIDENT'S MESSAGE | 4 |
| DRASTIC MEASURES: The Metric Assault on American Standards - Peter Seymour | 5 |
| MAILBAG | 1 Dozen |
| PROBLEM CORNER | 1 Dozen 8 |
| MINUTES | 1 Dozen X |
| WHY CHANGE? | 2 Dozen 2 |
| APPLICATION | 2 Dozen 3 |



The DSA does NOT endorse any particular symbols for the digits ten and eleven. For uniformity in publications we use Cap X with strikeout (~~X~~) for ten and the octothorpe (#) for eleven. Whatever symbols are used, the numbers commonly called "ten", "eleven" and "twelve" are "dek", "el" and "do" (pronounced *dough*) in the duodecimal system.

When it is not clear from the context whether a numeral is a decimal or a dozenal, we use a period as a unit point for base ten and a semi-colon, or Humphrey point, as a unit point for base twelve.

Thus $\frac{1}{2} = 0.5 = 0;6$

The recent Annual Meeting held at Bank Street College of Education in New York City on Friday, October 18, 2002 was extremely gratifying. Our dozenal party witnessed a unique educational experience with special thanks accorded to our Secretary Christina D'Aiello who graciously assisted in arranging the meeting. Christina is employed by the college as the Assistant Director of Computer Services and all were very favorably impressed by the excellent computer technology that is in place there. All colleges and universities would profit from viewing this model. The Graduate School of Education appears to be interested in the Society's message and we met four energetic faculty and staff personnel. The tour of the children's library was one of the highlights of our meeting. Tentatively, we look forward to returning to Bank Street in 2004 which will be the Five Dozenth Anniversary of our Society which initially convened in 1944 at the Gramercy Park Hotel in New York City.

On other fronts, our WEB SITE, www.dozens.org, is working well and we eagerly look forward to displaying feature articles on the site as a means for the populace to become better acquainted with us. Regular readers must have noticed our new colored glossy cover. The *Bulletin* serves as the lifeline of the Society. An ad hoc committee was formed to undertake a revision to improve the layout, make it more attractive and also more professional. In particular, Drs. John and Sharon Impagliazzo led the way in encouraging us in these changes

Two high points of this issue are our lead article, *Drastic Measures*, by Peter Seymour and our *Mailbag*. Peter's honest rebuttal of the decimal metric propaganda is refreshing indeed. Our Mailbag is overflowing with interesting ideas from our readers. Never before have we had this many pages devoted to your input. Please keep those letters and emails coming.

As editor of our *Bulletin* as well as President, I am always seeking and encouraging articles, puzzles, jottings, problems, and fillers dealing with various aspects of number bases and systems of numeration, particularly base twelve. If you have a good idea, please share it with us. Articles serve as a nice medium for student and/or faculty projects. Students gain self esteem as well as mathematical knowledge of number bases. As your President and Editor, I am gratified at with the diligence of our active members and always invite new energetic young people to both promote and further our cause. "Twelve Is Best!"

Best wishes,
Jay L. Schiffman,
President and Editor

**DRASTIC MEASURES:
THE METRIC ASSAULT ON AMERICAN STANDARDS**

by Peter Seymour

[Adapted from *Ideas on Liberty* (Jul. 2001) with permission of the author, a journalist, screenwriter & actor from Hoboken NJ. Emphasis added. Original is available online at contact@bwmaOnline.com.]

"Nothing is more contrary to the organization of the mind, of the memory, & of the imagination. . . . The new system of weights & measures will be a stumbling block for several generations. . . . It's just tormenting the people with trivia."

Such was the opinion of Napoleon about a novelty concocted by the Paris Academy of Sciences in the midst of revolutionary fervor: the metric system.

But that tormenting system, which Napoleon refused to inflict, has been forced on British citizens by their own legislators, yielding yet again to pressure from European Union bureaucrats. With the British bulldog rolling over to this cultural intrusion, one wonders if the US will go the extra mile to defend the yardstick.

Since America's infancy, metric missionaries have been frustrated by our steadfast resistance to being converted. They've blamed public ignorance, apathy & stubbornness, unenlightened industry, meager government funding, & more. But beneath the surface, our enduring allegiance to the US Customary System of Weights & Measures is rooted in a commonsense, even if largely intuitive, preference for this finely honed system of inches, pounds, quarts, & degrees Fahrenheit.

Most Americans can remember, from the late 70s, when US metric conversion was proceeding like a 5-year plan commanded by the Kremlin. Wall charts & study guides in grade schools indoctrinated students like me about the "superior" & "more scientific" SI (the new & improved version of metric). Although belittled as a hodgepodge of historical oddities, our customary measurement system withstood insults & assaults from the "inevitably global standard," the most visible vestiges of which are the "kph" markings on speedometers, the FDA-required nutrition labeling, & the liter-based soft drink bottles.

While compliant Canadians dove head first into metrication, we recalcitrant Americans ignored & laughed at it until it slinked away. Perhaps you saw the "Saturday Night Live" skit that lampooned the marvels of the metric alphabet, comprised of only ten letters! J, K, L, & M were combined into one character.

A quarter-century later, the metric crusade looks as quaint as the "Duck &

Cover” campaign of the 50s. But while the communists’ dream of world domination has faded away, the metric zealots persist in threatening our economic & personal freedom.

In their decades-long “re-education” to metric, defenders of British weights & measures—& of British sovereignty—recently suffered a drastic setback. Beginning in January 2000, merchants throughout the UK were ordered to give priority to the SI in their measuring, labeling, & oral communication, subordinating their traditional ounce, pint, & foot to a supplementary status.

According to the London-based Sun newspaper, whose “Save Our Scales” campaign regularly features small shopkeepers who run afoul of the metrication program & incur fines & confiscation of their imperial scales, Sunderland police & “trading standards officers” on 16 Feb. 2000, made an undercover purchase of a pound of bananas for 34 pence, from Steven Thoburn, a local greengrocer. He was thereupon arrested for weighing the loose produce in pounds instead of grams. A British court convicted Thoburn last April. Fines & further court costs of at least \$150,000 are anticipated. But the case will be appealed.

“I’ll serve my customers the way they want,” insisted Thoburn, who, having been dubbed the “Metric Martyr,” raised over \$40,000 for his defense in this test case. “But I’ve yet to find anybody who’s asked for anything in a metric way.”

Despite renewed sales pitches, regaling the glories of base-ten measurement & the progressiveness of global conformity, Americans aren’t buying metric. We remain committed to the familiarity, versatility, & greater accuracy of measurement practices that date back to the pyramids of Egypt—built with the same inch as found on a schoolboy’s ruler.

Metric in America

Starting back in 1790 Thomas Jefferson, then secretary of state, recommended that Congress introduce a decimal-based measurement system. While not proposing a specific scheme (the metric system was formalized 9 years later), Jefferson did advise that any new base units should resemble those already in common use wherever possible. Congress put the issue on the back burner, thus beginning a policy of benign neglect that continues to the present.

John Quincy Adams also advocated the metric system as a national standard, but Congress again left well enough alone. Forty-five years elapsed before Congress supplied each state with a set of metric weights & measures as it authorized

nationwide use of the new system on a *voluntary* basis, thus expanding our choice of measurement methods. In 1875 the US became one of 17 nations to found the International Bureau of Weights & Measures, based on metric. In 1893 the US Bureau of Standards adopted metric as its “fundamental system of standards,” which legally defined customary units in terms of metric equivalents. And that’s pretty much where things sat for the next 75 years.

Today, the use & importance of standardized measurement is vastly greater than at the dawn of the industrial age. Geodetic, topographic, climatologic, political, & road maps of the entire earth have been meticulously calculated with customary coordinates & charted in customary units. Surveys are the conceptual infrastructure for the layout of streets, highways, railroads, & parks; for the engineering of bridges, tunnels, canals, & dams; for the installation of pipelines, water mains, power grids, & cable networks; & for the positions of navigational beacons & the orbits of satellites.

Customary units, in blueprints & hardware, are built into our homes, ships, skyscrapers, churches, monuments, & historical landmarks. The construction & operation of nuclear power plants, airports & aircraft, military equipment, & the International Space Station, to name a few, are predominantly based on customary specifications. Our system is communicated through countless labels, cookbooks, manuals, textbooks, schematics, menus, & traffic signs. Preserved in our literature, songs, & movies, thriving in the daily conversations & habits of $1/4$ billion US professionals, consumers, & students, customary measure serves the diverse needs of everyone from carpenters to chefs, children to rocket scientists.

With such an enormous investment in physical & human capital, there ought to be a convincing reason to justify our suffering the stupendous costs, confusions, & hazards of drastically altering our measurement system.

One Size Fits All

The primary contention of metric advocates is that adopting a globally uniform system of measurement would greatly benefit the US economy. Fluency in metric, the Esperanto of measurement, would facilitate industry & trade by increasing our nation’s exports, competitiveness, productivity, & employment. This one-size-fits-all thinking, typical of metric missionaries, is plausible, but such assertions *are thoroughly refuted by experience & reason.*

The US General Accounting Office (GAO) is a respected government watchdog. Its Metric Report of 1990 summarized the *major economic burdens* of a forced

US metrication, & devastated pro-metric arguments with careful analysis:

Imports of metric products would increase because metric products required for US conversion would have to be obtained from other countries. Furthermore, due to the additional costs of conversion, US products would be more expensive than imported products that are already metric. Foreign countries would benefit from broadened markets & new economies of scale due to increased production & lower operating costs. The US would also be flooded with customary products produced by other countries to meet the continuing demand by the public for goods during the conversion period.

A pamphlet from Americans for Customary Weight & Measure (ACWM), a grassroots organization, passes along the warning: "Thousands of workers would lose their jobs & older workers would be displaced. Metric conversion would require massive retraining & would deprive the country of workers with valuable experience & the intuitive feel for measurement upon which craftsmen, mechanics, engineers & many other workers depend" ("Realities of Metrication" by Thomas Hannigan, International Brotherhood of Electrical Workers, 1977).

The preamble of the US Metric Conversion Act of 1975 enumerated the costs of clinging to our provincial ways, including: "3. World trade is increasingly geared to the metric system of measurement. 4. Industry in the US is often at a competitive disadvantage when dealing in international markets because of its non-standard measurement system."

But, reassuring the unconverted, the GAO noted, "Worldwide usage of US customary standards is still *much greater* than that of metric standards." Although US usage accounts for much of this, customary standards persist internationally in numerous forms, ranging from any use of latitude & longitude, to industry-specific units such as troy ounces & carats, to any production whose actual dimensions are tooled on customary units.

To clarify the last, the most successful photographic film format continues to be manufactured to its original specification of exactly 1-3/8 inches in width. The customary standard of this American invention has been eclipsed by its subsequent relabeling as "35mm," an *approximate* metric equivalent. This kind of soft conversion succeeds in giving *the appearance* of metric prominence, of greater precision, & of foreign industrial clout, but it doesn't alter the hard reality that about 2/3 of global industrial output remains based on customary specs.

In a shocking retort to those who scoff we stand alone among industrial nations

in rejecting metric, the GAO concluded, "*The US should not risk its industrial success, obtained under the customary system, by changing to a new system.*"

In spite of this unqualified verdict & the unswerving popularity of customary measure among US businesses & consumers alike, the metric system is the "preferred system of weights & measures for US trade & commerce," or so it was ordained by Congress in Public Law 100-418. In fairness, because this provision was furtively buried in the two-inch-thick Omnibus Trade & Competitiveness Act of 1988, it is doubtful that any congressman knew he was voting for it. Less excusably, by signing Executive Order 12770 in 1991, President George H. W. Bush directed federal agencies to proceed on their meddlesome path of advancing "the national goal of establishing the metric system as the preferred system for the US government."

If It's Better, the Free Market Will Buy It

In 1993 former Senator Claiborne Pell of Rhode Island, wrote a letter to President Clinton in which he pushed for further metrication by stating, "I am sure that you will agree that in order for this nation's businesses to be truly competitive with the rest of the world, we must play by the same rules." That comment is relevant to Olympic competition, but in the economic sphere it gives the three false impressions that measurement is a rule that requires conformity, that such conformity has advantages regardless of which rules are selected, & that the advantages of such conformity must be facilitated, if not mandated, by government because they will inadequately be sought out by market participants.

The rules that optimize trade & competitiveness are those that validate property rights & private contracts, while deterring infringements & fraud. Pell's deception was in representing a measurement system as a principle of free markets, rather than as it truly is: a tool & means of communication. As such, options are desirable because measurement functions best when properly suited to its task.

If markets were like sports, with businesses as teams, competitiveness among nations, as among separate leagues, would require uniformity of rules. However, markets do not specify procedures, limits, & goals. The free market is an open-ended discovery process where the freedom to choose a measurement tool, among many other options, is a vital means of seeking out efficiency, convenience, pleasure, & safety.

Any American business interest could & would label, package, & produce in metric *voluntarily & on its own* if doing so were profitable as measured by the

customary units of dollars. "The competitiveness question is a non-issue. US manufacturers, large & small, make their products in whatever units are required—as did Japanese makers in the fifties (& still)," says Patrick McCurdy, a consultant for the American Chemical Society, editor of a trade journal & author of "I'm Just Mild About Metric," *Today's Chemist at Work*, June 1994.

Naturally, compliance with industrial standards is often essential for a company's survival. Rival firms have even freely created format & operating standards when they find it mutually advantageous to do so. With no government prodding, Apple & IBM agreed to collaborate for just this reason in the mid-1990s, but the practice has a long history

In the mid-nineteenth century, railroads sprang up to serve regional freight & passenger needs. Because these ventures were mechanically as well as commercially autonomous, the gauge (rail width) had not been standardized. A problem arose when enterprises prepared to cooperate, but their tracks didn't match up. Due to the increasing pressures of the free market, these separate lines simply adjusted their gauges—sometimes in a weekend—to the standard 4'8.5".

American railroads even converged in creating a measurement system to synchronize schedules. Before the nation was connected by instantaneous communication & one-week coast-to-coast rail travel, "local time" meant that each town set its clocks to high noon. This made the charting of timetables a daunting task. So in 1878 railroad executives simplified roughly 100 different time zones into today's Eastern, Central, Mountain, & Pacific times.

Don't Give An Inch!

Harassed by means disarmingly reminiscent of those presently persecuting Mr. Thoburn, the post-revolutionary French citizen yielded to the meter, gram, liter, & centigrade thermometer, but the complete metric utopia, originally envisioned with a ten-hour clock, ten-day week, & 400° circle, was never consummated. Thanks to informed opposition & our healthy, intuitive resistance, Americans have never given an inch . . . thus far. But at the Metric Program Office (annual budget, \$500,000 to \$600,000 per year), our tax dollars continue to employ professional meddlers who view our freedom as a nuisance & take advantage of our trusting assumption that if something ain't broke, nobody's trying to fix it.

Fortunately, there are many easy ways for anybody to stand up for the foot. The vast majority of weighing & measuring is an integral part of our daily routines, our language, & our culture. Substantial power is in our hands. Personally, I use customary measure wherever optional & tell others about the precision,

practicality & poetry of our traditional measurement system. In a letter to the New York Times, I thanked an author for writing "¹/₃ of an inch" when other reports on the same surgical procedure wrote "5 mm." Any American publisher or broadcaster can independently favor customary measure as an editorial policy & convert metric into our language if necessary.

Like other conflicts of common sense versus simplistic dogma, the metric problem was contrived by government. But unlike a typical program, compulsory metrication doesn't derive strong support from a particular region, industry, race, age, income group, & so on. Just the opposite: The fact that so many people have so much to lose from disruptions to their customary system of measure presents a rare & tremendous opportunity for everybody.

Republican legislators can reassert their conservative & patriotic values, while Democrats will win appreciation from their trade-union base. Applause would even come from Libertarians, because they trust the individual, & Greens, because they mistrust international corporations.

Today's metric proponents aren't mounting a frontal assault like the one in the late 1970s, much less confiscating the scales of your neighborhood grocer. Having learned from past failures, they've implemented a stealthy strategy of pushing through small changes to nudge out non-metric options. The NY State Highway Dept., encouraged by federal initiatives, switched to metric in the 90s with hopes of being a leader in a national trend. US metrication is one of those issues that can slide from seeming too trivial to bother with today into being too large to reverse tomorrow. So remember, an ounce of prevention is worth a pound of cure.

Even as our government exhorts, "The uncertainty is not whether to move to the metric system, it is how & when to make the move" (US Metric Programs Board Pamphlet), we can take heart in the words of ACWM's Bob Falk: "Our system of measurement is *not* a haphazard collection of archaic units or the product of committees of sheltered academics with no practical experience in the real world. It's the result of more than 7,000 years of research & development by billions of people whose lives & livelihoods depended on useful, reliable measurement."

And that is why, so long as we defend our freedom, the measurement issue will never be decided in a government office. It will be settled at the Home Depot checkout counter, in grocery stores & kitchens, on the desks of editors & draftsmen, on shop floors, highways, & the moon, where thanks to missions achieved entirely with our out-dated pounds, gallons, & miles, America once again stood alone.



Cyrillic Characters

Jene Farmer of Canada writes: *I'm not familiar with the symbols you are using for 'ten' and 'eleven', but I found that two Cyrillic (Russian) characters (Ю, Я), which look very much like the Hindu-Arabic numbers 10 and 11, have worked fine for me. Have you ever considered using them?*

Editor's note: Ю is the letter yo, and is pronounced as the y in duke
Я is the letter ee, and is pronounced as the ee in see

In response we wrote: *At first sight, we worry that they look too much like the pairs of symbols 10 (do or ten) and 11 (do-one or eleven). This could cause many errors and lots of confusion by careless writers.*

Jene countered with: *I understand what you mean about their similarity to the "pairs of symbols 10 (do or ten) and 11 (do-one or eleven)" as you say (I prefer the underlined names, though I called them 'dozen' and 'dozen-one');*

I reserved the names ten and eleven for the two numbers preceding twelve, or dozen). But then, that was the reason I chose them, being connected as they are, to me they are easily recognisable as different. In hand-writing them, though, I found that they can be differentiated easily by first down-stroking, then slashing up into the next part on each. It is then simply a matter of training the eye to quickly recognise the differences between [10] & [Ю] and [11] & [Я]. After all - the Russians use the Arabic numbers same as we do, and they don't seem to have any problem in differentiating between letters and numbers?

ЮЯ

Duodecimal Application in Chemical Nomenclature

John McLeod, writes: Many years ago I had a brief career at Medical Laboratory Technology. One thing that stuck from this experience was a fascination with the mathematical aspects of chemical nomenclature. Now, after several decades, I find that I have made a serious proposal to introduce base-twelve codes into chemical nomenclature. If anything comes of this, a substantial number of research chemists are about to become very proficient in base-twelve thinking.

Stay tuned, this could get interesting.

Thanks,
John McLeod,
Halifax, Canada,
jwisemcleod@netscape.net

John and his friend and colleague Dan Peters presented a paper at the 17th Annual User Group Meeting of MUG a Daylight/SMILES User Group (formerly MedChem User Group) which was held 25 - 28 Feb, 2003. It can be found at <http://www.daylight.com/meetings/mug03/McLeod/index.html>

Editor's note: In the advanced Chemistry presentation re a proposed Duodecimal Application in Chemical Nomenclature, John McLeod and Dan Peters made use of dozenal notation to specify an angle and its corresponding time on a clock face where 12 O'clock represents 0°, 1 o'clock represents 30°. (See slides 26 and 27.)

Using *A* for dek (ten) and *B* for el (eleven) they divided the clock into twelfths and then 144ths.

They used the notation *x*:*y* to specify both angle and time, where *x* and *y* are dozenal digits. *x* stands for the number of hours, that is the number of groups of 30° (since $360^\circ \div 12 = 30^\circ$), and *y* stands for the number of groups of 2.5° (since $360^\circ \div 144 = 2.5^\circ$.)

For example *B*:1 leads to $B(30^\circ) + 1(2.5^\circ) = 330^\circ + 2.5^\circ = 332.5^\circ$.
Now dividing 332.5° by 30° yields 11.08333... hours. This, in turn gives 11 hours and .08333... times (60) minutes or 11:05 o'clock.

Similarly 1:*A* yields $1(30^\circ) + A(2.5^\circ) = 30^\circ + 25.0^\circ = 55^\circ$. Dividing 55° by 30° gives 1.8333... hours. This yields 1 hour plus 0.8333... times (60) minutes or 1:50 o'clock.



332.5 degrees or 11:05 o'clock



5.0 degrees or 1:50 o'clock

Linux

Brian Dean, member number 302; writes: Are you aware that in *Linux* (which is a free operating system) you have the capability to work with very large numbers using a program called *bc*. You can also specify the output base (i.e. you can specify base twelve but you will get *a* for ten and *b* for eleven). Given a modest computer, it is not unfeasible to for example, take the square root of two to a few thousand dozenal places using *bc*.

If you are familiar with *Linux* at all, do a "man *bc*" at the command prompt and the basics of *bc* will be explained.

Currently I am running the latest version of Red Hat on a Pentium 2, 433 and I am quite happy with it. I also loaded it onto my roommate's machine (a Pentium 233) and it runs decently on that computer as well. I don't recommend the latest version of Red Hat if you have a computer that is any slower than that, however there are earlier versions of *Linux* that are quite useful that will run fine on really slow computers (including a 386).

In short, if you have a decent computer by today's standards then I would recommend you look at www.redhat.com. If you have a fast connection you can download it yourself. If not then I recommend getting someone to burn it for you.

Documentation on how to load *Linux* can be found at www.redhat.com. In general, if you have Windows 95 or Windows 98 then I would use a program called "parted" to repartition your hard drive. If you have Windows NT, Windows 2000, Windows XP, then you would probably need special software, or you would need to reload everything.

Basically what *Linux* is, is an alternative operating system to Windows. There are many flavors of *Linux*, the most popular being Red Hat. Others being Mandrake, Slackware, etc..

After looking at www.redhat.com you can probably do a web search for the others. Mandrake tends to be a bit more user friendly and is better at detecting certain sorts of hardware. I consider Red Hat to be reasonably user friendly. Most of the others require a good working knowledge of *Linux* in order to use.

Given the way you dodekaphiles think, you might like *Linux*. It's free (i.e. everyone can freely copy it and distribute it to whomever they want). It's just

about as powerful and useful as Windows (i.e. you can type papers, browse the web, do e-mail, or anything else you would normally do in Windows except play games). Furthermore, everyone is free to make or suggest modifications to it (which is probably beyond the scope of most of you in the *Dozenal Society*, but the fact you CAN do that is impressive). And doing math work (such as working with base twelve) is MUCH easier in *Linux*.

Dozenal Watch?

Dr. Paul Rapoport, member number 230; and the creator of the dozenal clock (see this *Bulletin* WN 5#; Vol. 31; No. 3; Fall 1198;(1988.) writes: I wonder if anyone is interested in investigating the possibility of a dozenal watch along the same lines as the clock: digital, 4 digits total, operating in nested dozens. I don't have time at present to take on a search for a sympathetic and adventurous person to create what is needed.

As you know, the clock is "bilingual," or should I say "bimmetrical," in that it runs, sort of, in both dozens and tens. Running it in tens is more awkward, deliberately. A watch would not have to run in both systems, although it would be fun if it could.

Let's Use L for Ten

Bob Sindeldecker writes: Hi Folks,

I found your website via the DSGB. I am intrigued by the differences between the American and British attitudes toward dozenalization. The Brits like it because it would mean going back to their old system, while the Americans seem to like it because it's *new* to them, which is how Americans think, after all. (BTW I am American.)

I am sorry to say I haven't read most of the articles on your site, but I have a hard time with PDF. I am visually impaired and HTML works better for me. I was very pleased to see your "Excursion" pages in black with boldface yellow text though; that has excellent visibility. Er, nothing like the Brits with their black text on purple. :(

I am writing because of a problem I see with dozenal notation as it stands now. Both you and the Brits want to use a funky symbol for ten - I call it funky

because it will not work well. Neither the X or the upside-down 2 can be displayed on the standard seven-bar element of modern calculators. The X would have to be an H, which would look like a malfunctioning 8, and the upside-down 2 is already taken - it is 5.

Instead, why not use an upside-down 7? That comes out as L on the display. The upside-down 3 for eleven comes out as E and thus poses no problems. This would make dozenal counting compatible with calculators, which is critical if base twelve is to be accepted.

(Hmmm ... yeah ... but car models with the designation "LE" might be misconstrued as "ten-elevens!")

I could not read your article about metric, so I don't know if you thought of this, but wouldn't it be a good idea to go metric if the metric system were dozenal? We already have printers' measurements with points and picas (12pts = 1 pica; 6 pica = 1 inch) so why not extend it? Twelve picas would be two inches, easy to convert. One meter could be twelve of those units, which would be two feet exactly. And, 12³ of these meters would be about 1053 standard meters, or about equivalent to a kilometer.

What would really be amazing would be a society that counts entirely by twelves. I am sure it would be a lot more rational. An article on the DSGB site says that base ten makes us uncomfortable and a little nuts, and I believe it. How might things be different if our base number were easily divisible into thirds, fourths, sixths and eighths?

Who knows, with genetic engineering we might even be able to breed a whole population of twelve-fingered people who would take to dozens much easier than us. In fact, I recall reading something in *Ripley's Believe It Or Not* about a village in Europe where inbreeding had produced a norm of six fingers per hand. Those people had developed a dozenal system of their own without thinking about it.

Best Wishes,
Bob Sindeldecker,
Columbus, Ohio,
sindeldeckerr@hotmail.com

*

Metric Only Objection

[Member Bill Holdorf sent us a copy of his letter]

Dear Mr. McCracken:

Your 10-24 e-mail answer to my objection over permitting voluntary use of metric-only on package labels, only confirms the insidious nature of the metric movement in the U.S. over the last several decades. Your long list of how much metric is currently in use in the U.S. today, shows how surreptitiously metric supporters have made inroads in destroying an essential character of our American culture and life style, that is, our American standard weights and measurements.

You speak of voluntary use. That is merely a government ploy often used to discredit objections to a government policy or program bitterly opposed by the public. Seat belt use was also supposed to be voluntary, but government force easily followed. The fact is, use of metric was supposed to be voluntary, but the government used every means to force its use, such as forcing any company wanting a government contract to first agree to use metric exclusively, including construction blue print measurements, or don't bother to bid. Also, the federal government during the Clinton administration changed over to the exclusive use of metric in all its operations and purchases at a horrendous expense to the American taxpayers without full public disclosure, which shows how deceitful metric supporters have to be in order to further force use of metric.

The fact is, there is not one redeeming value in changing from the use of our American standard weights and measurement to metric, while there certainly is nothing wrong with showing both metric and our standard weights and measurements on all our products, especially for export purposes. The U.S. consumer would expect the same courtesy in reverse for imports.

The fact is, the U.S. has been instrumental in creating the greatest number of inventions, and has become the greatest financial and industrial nation in the world using the American standard of weights and measurements, while many nations that have foolishly converted to metric have come and gone many times over.

Again, there is no need for exclusive use of metric. The American consumer has a right to know what a dollar is buying in intelligent and meaningful weights and measurements that is in tune and harmony with our American life-style and culture of several centuries. We don't need foreign nations telling us how to live,

or how to change our American life-style or culture. We have a proven record of success with our standard weights and measurements, while metric nations have financially and politically floundered over the past 100 years or so.

Sincerely,
William J. Holdorf
6939 S. Harlem Ave., #517
Chicago IL 60638
Wholdorf@msn.com

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Can You Help?

hi. i'm a visual arts grad student at columbia university. I found your website with google. I've been trying to design a dozenal clock and I'm looking for someone who can build it. it's unique because it will only turn full circle once a day. do you know someone who can help me?

anyways ... I think your site is great and I'm a whole-hearted believer in standardizing base 12 for the masses. besides the clock, I've got an idea for building a base 12 calculator ... and a few other things.

thanks!
greg martin 560 riverside dr. #2w
new york, ny 10027

✱

National Duodecimal Week?

Jean Kelly writes: Dear Editor,

Each year the NCTM, attempting to advance the cause of an awkward decimal metric systems, declares the week in the tenth month containing the tenth day to be National Metric Week. Why doesn't the DSA proclaim a National Duodecimal Week?

Jean Kelly

Editor's note: The editors proudly announce that the *duodecade* of one dozen days from *twelve* noon on December *twelfth* to *twelve* noon on December *twenty fourth* will henceforth be an annual

NATIONAL DUODECIMAL DUODECADE

Furthermore, the full week from Sunday to Saturday which is contained therein will be a

NATIONAL DUODECIMAL WEEK

✱



Welcome!

We welcome our newest Life member James Egan, member number 376; of RI. ✱



[Problem Corner Continued from page 19:]

3. Show that the periods of the units digits of the Fibonacci and Lucas sequences in Base Dek are respectively five dozen and one dozen while in Base Twelve, the units digits of each sequence is two dozen.

SOLUTION 3 by Jean Kelly

The first 12; Lucas numbers in decimals are: 1, 3, 4, 7, 11, 18, 29, 47, 76, 123, 199, 322, 521 & 843. Their units digits are 1, 3, 4, 7, 1, 8, 9, 7, 6, 3, 9, 2, 1 and 3. It follows that they cycle thru periods of one dozen. The other cycles can be established in the same manner. QED

✱



Annual Meeting

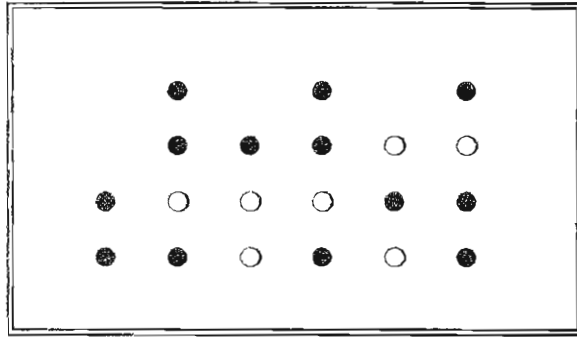
Our Annual Meeting will be held on 4 October at Rowan University, Glassboro, NJ. Please join us.

For info email us at Contact@Dozens.org

✱

Problems for Solution:

P88-1. An illustration in an advertisement for a "Powers of 2 Clock" shows a face as in this diagram:



The ad reads that "it's an eye-catching light show that changes every second. But its true purpose is to tell the time — in binary code, the zeros-and-ones language of computers. Techies love this clock and can read it right away." (Hint: It runs in 10; or 20; hour mode.)

1a. Can you tell what time the 7 lit bulbs (●) are displaying?

1b. Can you explain why the lights are arranged in the manner pictured?

P88-2. On page 13; of our recent *Bulletin*, Whole Number 84; Volume 42; Number 1 Bill Holdorf, Member number 359; found some Pythagorean triples. These triples can also be generated as (x,y,z) by where $x = m^2 - n^2$, $y = 2mn$ and $z = m^2 + n^2$.

Can you generate the first dozen primitive Pythagorean triples with both odd components prime? A primitive triplet is one in which there is no common factor dividing x , y and z .

Solutions to Previous Problems:

1. Consider the famous Fibonacci Sequence $FIB(N)$ which is recursively defined as follows:

$$FIB(1) = FIB(2) = 1 \text{ and } FIB(N) = FIB(N - 2) + FIB(N - 1), N \geq 3.$$

Thus $FIB(3) = 2$ and $FIB(4) = 3$. Show that every dozenth term of the sequence is divisible by twelve (and hence by 2, 3, 4 and 6).

SOLUTION 1 by Jean Kelly

Using Mathematical Induction:

Step 1. We show that the first dozenth Fibonacci number is divisible by twelve:
 $FIB(10;) = 100; \equiv 0 \pmod{10;}$ [that is it leaves no remainder when divided by one dozen]

Step 2. We show that if the k dozenth Fibonacci number is divisible by twelve then so is the $(k+1)$ dozenth Fibonacci number:

$$\text{Let } FIB(i) = a \text{ and } FIB(i+1) = b$$

$$\text{Then the next dozenth Fibonacci number, } FIB(i+\#) = 47;a + 75;b.$$

The inductive hypothesis is that $47;a + 75;b \equiv 0 \pmod{10;}$. That reduces to $7a+5b \equiv 0 \pmod{10;}$.

Now we calculate

$$FIB(i+10;) = 75;a+100;b$$

$$FIB(i+11;) = 100;a+175;b$$

Then the next dozenth Fibonacci number is

$$47;(75;a+100;b) + 75;(100;a+175;b) \equiv$$

$$7(5a) + 0b + 0a + 5(5b) =$$

$$5(7a+5b) \equiv 5(0) = 0 \pmod{10;}$$

QED

2. The Lucas Numbers are a Fibonacci-like sequence. $LUC(N)$ is recursively defined as follows:

$$LUC(1) = 1, LUC(2) = 3 \text{ \& } LUC(N) = LUC(N - 2) + LUC(N - 1) \text{ for } N \geq 3.$$

Thus $LUC(3) = 4$ and $LUC(4) = 7$. Show that no Lucas Number is a multiple of 5, 8 or 10;

SOLUTION 2 by Jean Kelly

The Lucas number are 1; 3; 4; 7; #; 16; ...

Written mod 5 they are 1; 3; 4; 2; 1; 3; 4; 2; ... Since no zero ever appears in this cycle, no Lucas number is divisible by 5.

Similar proofs hold mod 8 and mod 10;

QED

[Continued on page 17;]

**MINUTES OF THE ANNUAL
BOARD & MEMBERSHIP MEETINGS**

Friday, 16; October 11~~XX~~(October 18,2002.)
Bank Street College, NY, NY

Attendance: Paul Adams, Prof. Alice Berridge, Edmund Berridge, Christina D'Aiello, Dr. John Impagliazzo, Dr. Sharon Whitton, Prof. Jay Schiffman, Prof. Gene Zirkel, Dr. Patricia Zirkel.

BOARD OF DIRECTORS MEETING

1. Gene Zirkel convened the meeting at 11:30 A.M. The following Board members were present: Alice Berridge, John Impagliazzo, Jay Schiffman, and Gene Zirkel.

2. The minutes of the meeting of 5 October 11~~X~~9(2001.) were approved as published in *The Bulletin*.

3. The Nominating Committee (A. Berridge, J. Schiffman, and Pat Zirkel) presented the following slate of officers. A motion was made and seconded and the following persons were elected unanimously:

| | | | |
|-----------------|----------------|------------|--------------------|
| Board Chair: | Gene Zirkel | President: | Jay Schiffman |
| Vice President: | John Earnest | Secretary: | Christina D'Aiello |
| Treasurer: | Alice Berridge | | |

4. Appointments were made to the following DSA Committees:

Annual Meeting Committee: Alice Berridge and Gene Zirkel
Awards Committee: Gene Zirkel, Patricia Zirkel, Alice Berridge and Jay Schiffman.
Volunteers to these committees are welcome at any time.

5. The following appointments were made:

Editor of *The Duodecimal Bulletin*: Jay Schiffman
Associate Editor: Gene Zirkel
Parliamentarian to the Board Chair: Christina D'Aiello

Other Business of the Board:

Gene welcomed Paul Adams, Life member 40. Gene reported that Vita Alaimo, member 328; had emailed today with good health news. Gene handles information requests, supplying "Excursions with Numbers," "A Brief Introduction to Dozenal Counting," "Let's not go metric!" and the Panda Pamphlet. There have usually been about six dozen requests; last year there were only one dozen two requests. (In 11~~X~~7(1999.) there were three dozen requests and in 11~~X~~8(2000.) two dozen requests.) Members considered whether the decrease is due to increased use of the DSA website. Members felt that it would be a good idea to record "hits" to the website.

Minutes

The next Board Meeting will tentatively be held on Saturday, 4; October 11~~X~~# (October 4, 2003.) at Rowan University, Glassboro, NJ 08028-1701.

Acting for the Awards Committee, Gene Zirkel made three awards. The Board of Directors of the Society presented Alice Berridge with the Ralph Beard Memorial Award plaque of the Society for "her outstanding dedication & devotion as an advocate of Dozenal Counting & Measuring & for her many years of service to our Society as a Director, as Vice President, as Secretary & as Treasurer. In addition, her countless hours of service to Dozenal Committees & Projects is gratefully acknowledged."

Gene also presented the title of "Fellow" to members, Christina D'Aiello and to Chris Harvey for their loyal service to the Society.

The Board Meeting was adjourned at noon.

ANNUAL MEMBERSHIP MEETING

President Jay Schiffman gavelled the meeting to order at 12:06 PM. He thanked everyone for attending our first Manhattan meeting in many years and extended special thanks to Christina D'Aiello for setting up the meeting room, supplying refreshments and making arrangements for visits from Bank Street School faculty. He encouraged us to spread ideas for stimulating student projects and for possible articles. He would like to see more articles for *The Bulletin*. He led the discussion of the special Dozenal/Decimal calculator as presented by Harvey Kramer Hawks in the last *Bulletin*. Christina had a laptop on hand for us to examine and consider the "calculator." Members were very impressed with the simplicity and ease of Hawks' work. Gene agrees to contact Hawks to learn the bounds of the program. It is hoped that this can be downloaded from our website. It was suggested that members experiment with the "calculator" and get back to Gene with suggestions. Christina agreed to email the program to members in attendance.

A motion was made and seconded to give a free year membership to Harvey Kramer Hawks for his significant contribution to DSA.

A motion was made and seconded to improve the website so as to count the number of "hits" on the website (any time the website is accessed) and to add a statement: "Not a DSA Member? Never have been a DSA Member? Get a one-year free membership to DSA. Click here."

2. The minutes of the meeting of 5 October 11~~X~~9(October 5, 2001) were approved as published in *The Bulletin*.

3. Treasurer's Report - Alice Berridge

Alice presented Income Statements for the years 11~~XX~~(2002.) and 11~~X~~9(2001.) for comparison, as well as Membership lists for last year and a listing of current members from the recent membership drive. Members have made special contributions in 11~~X~~9(2001.) to the Society amounting to \$562.(\$794.) and in

11~~XX~~(2002.) amounting to \$17~~X~~(\$238.) so far. A second pitch for membership will be made soon. The checking account balance as of 15 October 11~~XX~~ was \$1397;(\$2275.). Last year there were seven student members; this year there are only two student members, so far. Only three members have used PayPal. Charles Marschner was the only member to earmark a special donation for students. Alice acknowledged the wonderful work done by Dick Trelfa with DSA membership cards. These are being mailed to members.

4. Editor's Report - Jay Schiffman

Sharon Whitton suggested that the cover of *The Bulletin* be changed to a bright glossy stock. She suggested that this would lead to a better impression — the current cover “smacks of an in-house publication”. Members were very impressed with this and her other suggestions and it was agreed that an ad-hoc committee with members Gene Zirkel, Pat Zirkel and Sharon Whitton meet and revamp the appearance of the publication. It was suggested that articles with appeal to younger readers be solicited or reprinted, that “best” articles from past issues be reprinted, and that a regular brief article be encouraged from DSGB. Jay said that he would like to print more puzzles and the supply is dwindling. Jay mentioned that indexing of recent volumes needs to be done. He acknowledged the laborious job that Fred Newhall had done for DSA when he indexed all volumes through 11~~X~~0(1992.). Members shared fond remembrances of Fred and his wife, Mary Newhall.

5. Annual Meeting Committee - Alice Berridge and Gene Zirkel

The next Annual Meeting will take place on 4; October 11~~X~~#(October 4, 2003.) at Rowan University in New Jersey. Gene will mail a copy of Jim Malone's special video on “Eggsactly a Dozen” to Christina who said that she may be able to improve the quality of the video. This will be shown at the Annual Meeting.

6. Nominating Committee - Alice Berridge

The Committee presented the following slate for the class of 11#1(2005): Paul Adams, Brooklyn NY, Ian B. Patten, Anchorage AK, Christina K. D'Aiello, Yonkers NY and Chris Harvey, Melville NY. The slate was elected unanimously.

Alice Berridge, Jay Schiffman and Patricia Zirkel were proposed as the Nominating Committee for the coming year. They were elected unanimously.

Christina D'Aiello was appointed Parliamentarian to the Chair.

(At this point members broke for lunch at the cafeteria in the building. After lunch Christina led the group on a tour of the Bank St. Building. She explained that several floors are for elementary school children, Other floors are for the graduate school of education. In all there are nine floors — the top floor is the gymnasium. Members were particularly interested in the library where the head librarian addressed the group. It was agreed to add Bank Street School to our mailing list.)

7. Awards Committee – Gene Zirkel

There were no awards for this year. Members are asked to suggest possible honorees.

8. Other Business:

John Impagliazzo led the discussion on digitizing *The Bulletin*. John said that his first contact would not be workable for our journal. He said that the scanning might rather be done at Hofstra University. He suggested that grant money might be needed. It might be possible for Chris Harvey to do the job. Gene will check with the Grant Officer at Nassau Community College and Christina will check into a special search engine option.

Hal Melnick, Mathematics Coordinator for the Graduate School at Bank Street School/College addressed the group on the program for mathematics teachers at the college. He said that bases are not regularly taught in his program because of time and curriculum limitations. He felt that inspired teachers could be the key. He was interested in our programs and said that he would share ideas with his adult students.

Michael Cook, Mathematics Coordinator for the School for Children at Bank Street also met briefly with members. He, too, agreed that bases are not regularly taught in the classroom but he was very interested in our message and took literature. He felt dozens might be a good approach for students who are ready for challenge. Members agreed that the school ought to be put on our mailing list so that materials and information could be available on a regular basis.

Jay Schiffman presented a brief lecture “A Most Appealing Integer, Twelve - Six Dozen Somewhat Intriguing Ideas Where Dozens Play a Role.” He supplied 60; properties or ideas. Property 4: “Twelve gross forms a crate” was a new term for some of us. Property 18; “In the decimal base, the positive integer 27720 represents the smallest integer divisible by each of the first dozen counting integers.” Property 45; “The complete graph, K5, on five vertices has twelve distinct Hamiltonian Circuits, This is essential in the Traveling Salesman Problem.” He also handed out an extensive table for the Fibonacci integer digits in base 12.

Members are very grateful to Christina, to her colleagues and to Bank Street School of Education for providing this wonderful meeting experience.

The meeting was adjourned at 5:10 PM.
We then retired to restaurant for Dinner
Respectfully submitted,

Christina K. D'Aiello, Secretary
Alice Berridge, Treasurer

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WHY CHANGE?

This same question was probably rife in Europe between the years 1000 and 1500, when the new Hindu-Arabic numerals were slowly making their inching progress in displacing the comfortable and familiar Roman numerals then universally used.

Yet, although it took D years, and despite much opposition--("Who needs a symbol for nothing?")--the new notation did come into popular use. Released from the drag of Roman notation, people's thinking leapt forward dramatically, and mathematicians discovered a new dimension in mathematical symbolism. Working with Hindu-Arabic numeration, they found that the new system better accommodated mathematical statements and facilitated the working out of ideas. Re-examining their fundamental concepts of numbers, they made advances in arithmetic, algebra, logarithms, analytic geometry and calculus, and thus contributed to the explosion of human thought which later became known as the Renaissance. Then, in a related development, people awoke to the fact that different number bases could be used.

A parallel to today seems tenable. The notation of the dozen base better accommodates mathematical statement and facilitates ideation. It, too, is a step forward in numerical symbolism. The factorable base is preferred for the very same advantages which led the carpenter to divide the foot into twelve inches, the baker and the grocer (one who deals in *grosses*) to sell in dozens, the chemist and the jeweler to subdivide the Troy pound into twelve ounces. And yet, this is accomplished by such simple means that students in the primary grades can tell why they are better. Literally, the decimal base is unsatisFACTORY because it has **NOT ENOUGH FACTORS**.

Then should we change? Yes, but no change should be forced, and we urge no mandated change. All the world counts in tens. But people of understanding should learn to use duodecimals to facilitate their thinking, their computations and their measurements. Base twelve should be man's second mathematical language. It should be taught in all the schools. In any operation, the most advantageous base should be used, the one best suited to the task at hand. (Similar to computer scientists use of binary, hexadecimal or octal - whichever is most convenient.) If this were done, duodecimals would progressively earn their way into general popularity because they simplify the all-important problem of the correlation of weights and measures, the expansion of fractions ($1/3 = 0;4$) and give an advantage in calculations involving time and our twelve-month calendar. Perhaps by the year 2000, (or maybe by 1200; which is 14; years later!) duodecimals may be the more popular base. But then no change need be made, because people will already be using the more convenient base.

If "playing with numbers" has sometimes fascinated you, if the idea of experimenting with a new number base seems intriguing, if you think you might like to be one of the adventurers along new trails in a science which some have erroneously thought staid and established and without new trails, then whether you are a professor of mathematics of international reputation, or merely an interested pedestrian who can add and subtract, multiply and divide, your membership in the Society may prove mutually profitable, and is most cordially invited *

YOU ARE INVITED TO JOIN THE DOZENAL SOCIETY OF AMERICA

The only requirement is a constructive interest in duodecimals

Name _____ / _____ / _____
Last First Middle Date

Mailing Address (including full 9 digit ZIP code)

Phone: Home _____ Business _____

Fax _____ E-mail _____

Business or Profession _____

Annual Dues Twelve Dollars (US)

Life One Gross Dollars (US)

Student (Enter data below) Three Dollars (US)

(A limited number of free memberships are available to students)

School _____

Address _____

Year & Math Class _____

Instructor _____ Dept. _____

College Degrees _____

Other Society Memberships _____

To facilitate communication do you grant permission for your name, address & phones to be furnished to other members of our Society?

Yes: ____ No: ____

Please include on a separate sheet your particular duodecimal interests, comments, and other suggestions.

Mail to: Dozenal Society of America
% Math Department
Nassau Community College
Garden City LI NY 11530-6793