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THE DOZENAL SOCIETY OF AMERICA
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✧ Visit our Website at www.Donzenal.org ✧

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 calculations, 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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THE
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Whole Number Nine Dozen Three

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IN THIS ISSUE

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The DSA does NOT endorse any particular symbols for the digits ten and eleven. for uniformity in publications we use the asterisk (✱) for ten and the octothorpe (#) for eleven. Whatever symbols are used, the numbers commonly called "ten", "eleven" and "twelve" are pronounced "dek", "el" and "do" 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 ½ = 0;6 = 0.5

President's Message

Our Annual Meeting convened on Saturday, October 7, 11#2;(2006) at Nassau Community College/SUNY in Garden City, LI, NY. We were very pleased to meet Michael DeVlieger who traveled from his hometown of St. Louis, MO to attend our meeting. Michael presented a generous gift to the DSA which we greatly appreciate. In addition, he was very willing and able to assist us with our Website and he articulated a number of excellent ideas to achieve this. For more on Michael's contributions see the Minutes on page 1 dozen 8.

The Board of Directors of The DSA took great pride and pleasure in bestowing our Annual Award on two most deserving DSA friends: Christina D'Aiello and Dr. John Impagliazzo. Christina and John have worked tirelessly improving our Website. When completed, classic articles on dozenals, past issues of our *Bulletin*, links to our sister society, The Dozenal Society of Great Britain, and related materials will be available on-line. We have a number of these items in place at the present time and are diligently working to complete the project. This is an enormous undertaking and Christina and John richly deserve kudos for initiating and constantly improving the project. Christina joined the DSA after our 11X4;(1996.) Annual Meeting held at Hofstra University with the Computer Science Club. After graduation from Hofstra with a degree in Computer Science, Christina became Network Manager at Bank Street College of Education in New York City, a most engaging and unique institution which offers Pre K and elementary education in addition to graduate programs in education. Dr. Impagliazzo has been a Professor of Computer Science at Hofstra University for more than two dozen years.

He has served in the role of department chairperson and has advised many students including Christina. He is the author of numerous articles and several books, one on discrete mathematics, and is a member of The Mathematical Association of America. We are delighted to have such outstanding and collegial individuals working with us to spread the gospel that Twelve Is Best!

On another front, it is important that a vibrant organization has happy dues paying members. Our dues at one dozen dollars per year are far lower than traditional societies engaging in mathematical and scientific pursuits. We encourage and greatly appreciate voluntary contributions. Both membership dues and voluntary supplements are tax deductible. And you can use Pay Pal to pay dues on line. In addition, do not keep your good ideas on number bases to yourself. Share them with our membership. Consider writing a brief article for our *Bulletin, which is referreed.* Finally best wishes in the year 11#3;(2007.)!

Professor Jay L. Schiffman, President

A "58,54" & 2,066; & 3,534. Word Essay:[1]

A Discussion on the Varying Numbering Systems in the World
and History's Influence on the Modern Day Numbering System

By Scott Proctor

[SCOTT IS A HIGH SCHOOL SENIOR AT L. D. BELL HIGH SCHOOL IN TEXAS. HE WROTE THIS ESSAY TO FULFILL A GRADUATION REQUIREMENT.]

The number of fingers on two human hands, the number of toes on the human body, the number of dollars in a ten dollar bill, the number of millimeters in one centimeter, the number of years in a decade. All of these values have one number in common…ten. The use of the number ten can be seen anywhere in the world today and it is used most prevalently in the study of mathematics. The number ten prides itself as the universal power for the international number system. One must count to ten before creating a two digit number, and then once reached, another ten must be added to change the leading digit in the number, and so on. Every measurement of years such as the decade, century, millennium, etc. is divisible by ten. But, the United States' measurement system also utilizes a base twelve format making almost all of the standard units divisible by twelve such as the foot, the number of months in one calendar year, one dozen, and the hours in a day. In addition, we use base sixty in astronomy, in measurements such as the one hundred eighty degree triangle and horizon, the three hundred sixty degree circle, and the number of seconds in one minute or the number of minutes in one hour. The thought of using base ten, base twelve, and base sixty in everyday life can be challenging and confusing at the least. So, one might ask his or herself, why ten? Why not twelve or sixty? What would make one be chosen over the other? To answer such questions one must journey back to the ancient times of the Babylonian Empire before he/she can comprehend the value of ten, twelve or sixty for that matter.

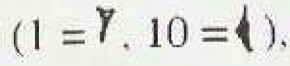
most of the standard units are divisible by twelve

The early Babylonians were an agrarian people with little need for calculus and algebra; therefore geometry began as the basis of higher mathematical thought (Melville[1]). In order to fuel their mathematical needs at the time, they used a base sixty numerical system (Boyer[2]). Presently, the internationally accepted system is that of base ten. The base represents the number of numerals used in

[1] Edited for publication. Originally titled *58, 54 and2,066 and 3,534 Word Essay.* The numbers may have changed due to minor alterations. - Editor

each of the columns such as the one's column and the ten's column; therefore the numerals used are 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. These numerals are arranged in such an order that each place value to the left or to the right of the "decimal" or fractional place is a power of ten (of ten multiplied by itself; for every time one moves to the left that is the number of tens in that column). In a base sixty system, sixty numerals are used in the one's column, and the "ten's" column is essentially a "sixty's" column (Boyer[2]).

Chart 1 (Sizer[3])



$$3 \times 60^2 + 32 \times 60 + 31 = 12{,}751.$$

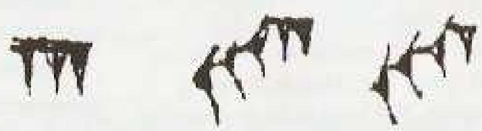


Chart 2 (Otto Neugebauer[4])

The number 3602 is "1,0,2" in base sixty		
1 is in the 2nd power's column	0 is in the 1st power's column	2 is in the 0th power's column

In order for further research on the Babylonian scientific methods to proceed with ease, Otto Neugebauer[4] (a commentator and translator of Babylonian texts) created this modern notation of the Babylonian numerical system with Arabic (or Hindu-Arabic) numbers as digits instead of the original Babylonian symbols. Therefore, "1,0,2" = (1 x 3600) + (0 x 60) + (2 x 1) = 3602.

Though mathematically the Babylonian number system is in base sixty, the notation, however, is written in a "subbase ten notation" (Sizer[3]). Thus, the findings in Chart 1 show that though the place values advance by powers of sixty, the actual counting of the numerals is represented by tens. In the Babylonian system in each column the count is by tens, yet only two symbols are used. Contrast this with our modern Arabic numerical system where we use ten differen symbols (zero through nine) that are repeated in multiple orders to create new values. (Robson[5]).

The first two symbols in chart 1 represent the *Arabic value for one and ten.* So, instead of creating new values by rearranging a range of symbols, the Babylonian kept it simple and just repeated the value for one until the number ten was reache and thus continued the process but in a mathematically base sixty approach (Sizer[3]). This approach led historians to at first perceive the number system as a base ten system until mathematicians were able to determine that the place values for each number was a value of a power of sixty (Robson[5]/Sizer[3]). Thus the discovery that the Babylonian system utilized a "subbase" ten notation and a mathematical base sixty showed that it is unique, different from any other numerical system in the world.

Base sixty is unique

Since the numerals are counted by tens, a connection between the modern base ten system and the Babylonian notation presents itself. So, theories began to arise about the strange counting system and how the digits were actually counted in base ten (Katz[6]). The common theory of the number of fingers on the human body poses a valid argument in this case in that the symbol for the value one in the Babylonian system might resembl a human finger and the fact that it is repeated until the value of ten is reached. Although, other theories about the connection between the two notations focused more upon the mathematical realm of the system and many of their technological innovations rather than the writing of the systems themselves — innovations such as the clock and its dozenal numbering, for example.

But if one were to understand the Babylonian counting system, then the clock would make logical sense to those with less mathematical training (Katz[6]). First is the minute. One minute holds the value of sixty seconds. Then, one hour holds the value of sixty of those minutes, thus, sixty multiplied by sixty yields the value three thousand six hundred (the number of seconds in one hour), or a "1,0,0" in the base sixty notation (Otto Neugebauer[4]). The "1" represents one value of the second power of sixty (as seen in Chart 2), a "0" represents no quantity in the "sixty's place", and a second "0" for no quantity in the one's place. So, in the

Babylonian counting system, instead of writing 3600 seconds, we write "1,0,0".

Chart 3

	Base Ten	Base Sixty
Numerals used	0,1,2,3,4,5,6,7,8,9	0,1,2,3,4,5,6,7,8,9,10,11,12 13,14,15,16,17,18,19, 20…59
The number 100	100.	"1,40"
The System's powers	First power 10^1 (10 x 1) = 10 Second power 10^2 (10 x 10) = 100 Third power 10^3 (10 x 10 x 10) = 1000	First power 60^1 (60 x 1) = 60 Second power 60^2 (60 x 60) = 3600 Third power 60^3 (60 x 60 x 60) = 216000

Thus 100. = "1,40". Due to the possibility of ***one or two digits*** *in the ones column, we insert a comma to indicate where the places are separated. So, for the number 100 there is a one in the "sixty's" column representing 60 followed by a comma and then a forty in the one's column representing 40, thus (1 x 60) + (40 x 1) = 100.*

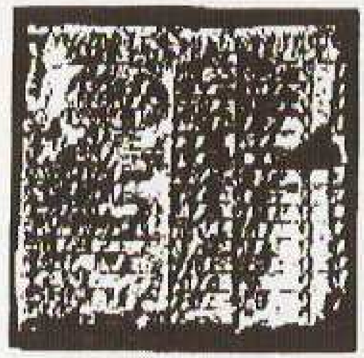
Also, the notation for the fractional point is represented by a semicolon (Neugebauer[4]). Thus 0.5 in base ten = "0;30" in base sixty.

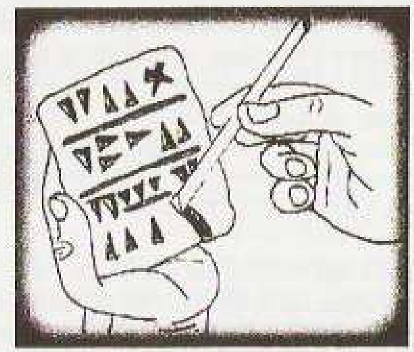
So, with the understanding of how base sixty can in fact make geometry simpler with the use of the one hundred eighty degree horizon, the three hundred sixty degree circle, etc, a new question arises. Why isn't the base sixty counting system used presently? And, how was the base ten system adopted? Many historians and mathematicians believe that much of the Babylonian science was lost in invasions from the Persians, the Greeks, the Romans and tribal empires of that area (HistoryWorld[7]). Eventually the empire was lost and left in ruins from the various invasions. But somehow the astrological information was kept and later used by Roman philosophers.

Ian Johnston[8] presented a radio broadcast on February 1, 1999 entitled "Turtles All The Way Down: Astronomy and Theology in Ancient Times" Johnston's talk included Babylon's many rulers, how their astronomical systems worked, and hov they were passed down though under the control of multiple entities was discussed.

Babylon's first capital was erected under the first Babylonian ruler Hammurabi around 1700 B.C. As time progressed, the astronomers of the empire began to study the cycles of the moon and the sun using base sixty as a basis for their measurements. They made a transition from using bones and sticks as means of keeping records to etching their calculations onto tablets of stone. Many tablets were created from clay. The wedge shaped writing is known as cuneiform. It was used as a means of keeping record of data from astronomical studies. Around a half million of these tablets can be found in museums today. The left hand picture in Chart 4 is one of a tablet created by the Babylonians under the rule of Hammurabi.

Chart 4 (Iraundegui[9])





With these tablets they were able to record data which helped them to configure extremely accurate predictions of the moon's risings and fallings. But, they never advanced to the actual geometry of the path of the moon. However, the Greeks were able to use the data from the Babylonians when Seleucus I (a general of Alexander the Great's Army) invaded around 300 B.C. The mathematicians of Babylon were secluded under the rule of the Greeks and thus, the work that the Greeks were not interested in was lost. Greece, however, made phenomenal advancements in astronomy due to many philosophers, mainly Plato and Aristotle. The storyline from there is a long one with several indirect twists and turns and unintentional relationships that held the very existence of astronomy and the only remaining mathematical works of the Babylonian Empire to a single book.

Plato, teacher of Aristotle, thought of the astronomy passed down from the Babylonians as merely theoretical and as he expanded on it he continued to label his thoughts as mere theory. However, Aristotle was considered more as a scientist than a theoretical philosopher of sorts. He liked the early mathematics of the Babylonians and the system of measurement they used. Therefore he continued to use it though his predecessor refrained from defining celestial movement as geometrical. But, under all of this study, a more important story was establishing itself. Aristotle, one of the remaining philosophers in the world to use the Babylonian system of numbering with astronomy, had a strong influence upon one of the great rulers of that time, Alexander the Great. He was a tutor of the young Alexander who spent many of his later years in Egypt. When he died, the general in charge of several areas in Egypt convinced the king of Egypt at the time to create the first known research institute in the world in honor of the late Alexander — the Alexandrian Museum in present day Alexandria, Egypt. There, Aristotle's teachings were passed down and catalogued in some of the hundreds of books held in the institute. But, years later the teachings were spread far and wide and became of little importance to the advancing Egyptians. Yet, around 110 A.D. a philosopher named Claudius Ptolemais (or Ptolemy) picked up on Aristotle's teachings in a rebirth of astronomy at the time. He continued on with his studies and made some of his own advancements as well as including his own theory on planetary motion. In his later years he wrote one of the most influential books on astronomy to date, titled *Almagest*. This book is said to be the link between the Western world of astronomy and the early Babylonian studies of the celestial universe. (Johnston[8])

There still remains the question of how the base ten system made its way into the mathematical world and why it was chosen over the sexagesimal numbering system of the Babylonians. Actually, the systems were never chosen one over the other; for in Mesopotamia, the most important person in society was the king and the organization of human society was largely to please and facilitate those things that he wanted. Therefore, when Alexander the Great invaded Babylon he and his generals became kings of the empire. Thus his science and mathematical techniques became the standard for all of the Persian Empire, and base ten had its triumph over the sexagesimal system by pure accident. But, the Greeks were not the originators of this innovative decimal system; one must journey back further than the Babylonians to discover base ten's true origins.

base ten had its triumph by pure accident

The first use of a base ten decimal system was around 3000 B.C. in ancient Egypt in which they used the modern day digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 later to be known as Arabic numerals (O'Connor[10]). In order to document findings and various studies, they used Sanskrit texts as ways of recording information for

themselves. These Arabic numerals were not named 'Arabic' until the European invasion. India was a thriving land. They avoided most foreign conflict due to the country's geographical positioning, but Alexander the Great and his conquest stormed the Persian Empire and eventually made it to India. Similar to the Babylonians, the natives of India were a primarily agrarian society with much interest in studying and learning new ways of thought instead of building armies. Therefore the battles were easily won by the Greeks giving Alexander and Greece full reign over the Persian Empire and all of its economic and intellectual wealth (SuniSystem[11]). With control of almost all of the Middle East, Greece opened trade lines into all parts of their new territory, bringing back art, literature, and more importantly the ancient Sanskrit texts of Indian mathematics. Greek philosophers and mathematicians studied the works of the Indian math system and soon adopted it as their own. They liked the idea of a base ten decimal system over the sub par mathematical system that the Romans had developed, making the world's mathematical system that of India with the use of Arabic numerals.

With this adoption of the Arabic numbering system and the idea of using a base ten decimal system, the Babylonian mathematical methods were in a sense worthless to the Greeks other than for the use of the sexagesimal notation in astronomy and navigation (HistoryWorld[7]). The universal numbering system seemed to be set in stone. Base ten might be the best method for mathematical study while the sexagesimal system might fit properly for astronomy, navigation, and many aspects of geometry. And, for hundreds of years, it remained that way. But questioning of the base ten system began to arise and whether or not it was the best system to use (Zirkel[12]). Traces of such questioning can be found as far back as 1585 with Simon Stevin and his thoughts on how a base twelve system would better suit the universal base for mathematics (Dozenal Society of America or DSA[13]). Other criticisms of base ten and the advantages of a base twelve were out forth by King Charles XII (1700), Sir Isaac Pitman (1855) who began teaching his school classes how to use the duodecimal (base twelve) notation, Grover Cleveland (1928), and F. Emerson Andrews[14] (1934) who wrote several books on the benefits of base twelve and its proposed superiority over base ten (DSA[15]). From a mathematical point of view, it does have several aspects that base ten does not have. First of all, twelve has more divisors than ten does; it has 1, 2, 3, 4, 6 and itself while ten only has 1, 2, 5 and itself. The duodecimal system also incorporates some standard measurements of time, length, and several other values in that there are twelve months in the calendar year, twelve inches in one foot, and twelve units in one dozen. Therefore the adoption of the duodecimal system might help to fit many standard units of measurement that already exist (Andrews[14]). Also, some common fractions used in measurements, such as one third, and one sixth, cannot be made using a denominator of ten or a power of ten.

Many of these fractions can be made while still using a denominator of twelve or a power of twelve (Andrews[14]). But with all of these advantages come questions such as why hasn't the universal base been changed to twelve or would we want to change to a base twelve system? But an even more interesting question arises; what would the new symbols for ten and eleven be? In base ten, the number ten is the equivalent of a one in the tens place and a zero in the ones place (1 x 10 + 0 x 1), but with base twelve there would not be a two digit number until twelve is reached thus two new single digit numbers would need to be created to take on the value of ten and eleven (Zirkel[12]) (for example: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ✱ **{a new symbol for ten}** , and # **{a new symbol for eleven}**).

Chart 5 (Zirkel[12])

	1/2	1/3	1/4	1/5	1/6	1/8	1/9	1/10	1/12
Base Ten Fraction Equivalent	5/10	—	25/100	2/10	—	125/1000	—	1/10	—
Base Twelve Fraction Equivalent	6/12	4/12	3/12	—	2/12	18/144	16/144	—	1/12

Then the new twenty three would look like "1#", because there would be a one in the twelve's place and an eleven in the ones place which would now hold twelve ones instead of just ten (1 x 12 + 11 x 1 = 23). Thus 1# in base twelve equals 23 in base ten. When there is any confusion we use the semicolon to indicate the fraction point in dozenals and a period in decimals, writing 1#; = 23., for example. So, instead of changing to the second power of ten within the clock's rotation like today's clock, there would only be a change of power at the top of the clock where twelve used to be. The clock would essentially read 10, 1, 2, 3, 4, 5, 6, 7, 8, 9, ✱, #, and then back to 10. The same concept would work the months of the year as well, with a change to the second power of twelve only on the last month giving the year a sense of completeness mathematically. All of this sounds like it could work out very nicely mathematically, but there is one problem. The conversion would cost a large amount of money in printing new labels and books, but more importantly would be the teaching of the new concept to people of all different mathematical backgrounds. And, as history has shown, the population tends to be reluctant to change. "I think that common people have resisted and rejected this accident (of having ten fingers) in favor of simple ordinary fractions because they know which is really more convenient" (Zirkel[12]).

base ten might not be the best fit for society

Currently, I have been keeping up with the DSA, Professor Zirkel[12], and their interests in a change to a universal duodecimal numbering system. I have looked into their ideas on a method of conversion from today's base ten to a possible new base twelve. I have also explored much of the reasoning they have for changing including the benefits and drawbacks of such an enormous change in the mathematical world. In addition, I have visited the website of the Dozenal Society of Great Britain in order to compare the ideas of each society. Both societies have the common goal of pushing towards a universal base twelve numbering system, yet due to geographical locations, each has its own battle. Because the decimal metric system was first introduced in Europe, some of the European population feels a much larger threat from the idea of a duodecimal notation than that of the American population (Whillock[15]). The metric system never caught on in the United States, therefore the change could possibly be much easier for the American population compared to the difficulty of changing measurements in many European nations (Spiegl[16]). History has thusly shaped the way mathematics has evolved and how it still progresses in all bases and systems.

The title of my paper is written in three different base notations: base sixty, base twelve, and base ten. All three notations are correct mathematically, yet to the eye, one almost seems more correct. That is due to familiarity from history and the use of base ten for so many years even though one system might seem more reasonable. But would all of the new notation be too much for society to take? Would everyone want to go through the trouble of learning a new system and learning to read new values on everyday items such as a 10; pack of soda (new notation for a standard twelve pack of soda)? The trouble with a better numbering system is that though it might benefit the mathematical world, it might not be easy or desirable to change to a new system just as the Greeks did not translate the Babylonian's works on astronomy that were written in base sixty. In a way, it is ironic that mathematics can be seen sometimes as always having a correct answer, yet no single base system can be exclusively classified as better than any other system. Each individual numbering system may have advantages that the others lack, but base ten was arrived at on the basis of historical events, not the decision of which might be the best fit for society. So, should we have a worldwide vote on which system we want? Perhaps. But, whichever way we choose, history will still have had its effect on *how mathematics has developed, no matter what base we may count in.*

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Can you rearrange the letters in

ELEVEN PLUS TWO IS DO ONE

into the *equivalent* statement:

_ _ _ _ _ _ PLUS _ _ _ IS _ _ _ _ _ _

Solution on the following page.

ANNUAL AWARD

THE RALPH BEARD MEMORIAL AWARD

of the

DOZENAL SOCIETY OF AMERICA

is hereby presented jointly to

CHRISTINA D'AIELLO
&
JOHN IMPAGLIAZZO

for their many years of service as officers of our Society
but especially in recognition of their time-consuming work
in creating and maintaining
our new and outstanding website.

Given with gratitude by the Board of Directors on behalf
of all those who have benefitted from their untiring efforts.

11#2; 2006.

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Solution from page 1 Dozen 3: TWELVE PLUS ONE IS DO ONE ∗

ASSESSING WEIGHT (IN POUNDS) OF EMPIRE

by Evan Casper-Futterman

THIS ITEM APPEARED AS AN EDITORIAL IN THE
VASSAR MISCELLANY NEWS ON 09/21/06

I am generally an ardent critic of the United States government, especially when it relates to issues of international cooperation or shared purpose between countries. Why does the United States feel compelled to defend its sovereignty against the goals and ambitions of all humanity, as embodied in the Kyoto protocol, the International Criminal Court, or the United Nations Convention on the rights of the child—signed by all UN members except for the United States and Somalia? Yet on one critical point I applaud the United States for its continued obstinacy, and indeed wish that our quests for imperial dominion would extend to the sphere of units of weights and measures.

In this realm, the world has made the unfortunate decision to adopt the Metric system, beginning in 1791 with our revolutionary brethren, the French. According to the U.S. Metric Association, as of 2005 only three countries had "not completed the changeover" to the metric system: the United States, Liberia, and Myanmar.

the world has made the unfortunate decision to adopt the Metric system

The intensification of global trade and communication has made the logic of an international system of units and measurements widely accepted. To be clear, I don't intend to argue against an international system of weights and measures—my distrust of modernity can extend only so far. It would be too sad to watch millions of dollars of space-travel equipment crash into other planets because of confusion in a unit of measure. Nevertheless, even if we agree that uniformity is beneficial, the choice still has to be made.

the choice still has to be made

Big choices involve ideologies: a set of values that would motivate a person, a group of people or country to choose one over the other. The Metric system is one such choice. Reflecting the dominant ideals of the scientific revolution, it embodies the idea that humans can manipulate our complex surroundings to fit what are, in my opinion, relatively insignificant creative and computational capacities. The quantities of its base-ten denominations are clearly more amenable to a laboratory than they are to life on our still less-than-fully-sterilized planet.

relates neither to natural evolution nor long-standing human scales and experience

The anti-Metrication movement can claim its righteousness in its anti-authoritarian grounding. As an extremist tendency of the state, authoritarianism seeks to make its inhabitants and all things easily legible—that is, observable and controllable, and subjected to its will (see James Scott's *Seeing like a State*). Because the Metric system carries this legacy of government compulsion enabled by scientific precision, and relates neither to natural evolution nor long-standing human scales and experience, it can be seen as an unwelcome imposition of power.

an unwelcome imposition of power

Closely tied to these is the importance of tradition for something as simple and culturally bound as measurement. There were days when one could calculate the extent of his or her land without the use of any instrument beyond his or her own body. These were not inherently better times, but they were days when a person could understand how the world in which he or she existed was connected and functioned. When the units for measuring produce—pecks, bushels, hogsheads—were as odd and mottled as the fruits and vegetables themselves.

Remembering odd names and less-than-optimal numbers and conversions keeps us honest and prevents mental sloth. They remind us that this world was not created for our exclusive use, and does not favor round numbers, easy conversions or solutions. Neither was it created for our complete comprehension. In our Metric future, our increasing desire for "ease of use" and efficiency will lead us to continue tricking ourselves into surrendering the things that make us human to the will and work of experts and machines. We will wander further into the fantasy that although we may have once come from the earth, we no longer need it and we do not plan to.

See the Editor's Note on page 2 Dozen 1

EU'S METRIC OBSESSION

US firms will fall foul of EU's metric obsession

An extraordinary row, involving major European and US industries, is blowing up over the European Commission's determination to make it illegal, in three years' time, for any products made in or imported into the EU to carry any reference to non-metric measures. Not only will this cost industries on both sides of the Atlantic billions of dollars and euros, but it is in direct breach of US federal law.

direct breach of US federal law

The Commission is so set on stamping out the hated non-metric system that, as of January 1, 2010, it is imposing a total ban on what it calls "supplementary indications" – ie any mention of inches, pounds or other non-metric units in advertising, labelling, catalogues, manuals and the like.

What will become illegal, under directive 80/181, is the current freedom of choice whereby both systems can be used to assist understanding; as, for instance, where a supermarket or market stall puts "lbs" as well as kilograms; or where car tyres are identified in a mix of inches and millimetres and their pressures can still be legally measured either in bars or in pounds per square inch. (It will hardly promote safety when most British drivers haven't a clue how much air to put in their tyres and it becomes illegal for the pump to indicate the "psi" equivalent.)

In other words, any US company wishing to sell to the EU will have to set up separate inventories and warehousing to ensure that its products carry no reference to non-metric units. Any European firm wishing to sell to the US will not be allowed to refer at all to the units its American customers understand. This in itself will be illegal under the US Fair Trade and Packaging Act, which permits use of metric units only so long as they are accompanied by a US non-metric "translation".

Among the European trade associations protesting at the ban is Orgalime, which represents 130,000 companies in the manufacturing, electrical, electronic and metalworking sectors. Its plea that flexibility should be allowed to remain is backed by the top European business organisation, Unice. In the US similar protests have come from the National Association of Manufacturers and the National Electrical Manufacturers Association.

[Continued on page 2 Dozen 1]

Minutes

DOZENAL SOCIETY ANNUAL MEETINGS
7 October 11#2;(2006)
Nassau Community College
Garden City NY 11530

Annual Board Meeting

Attendance: Gene Zirkel, Jay Schiffman, Christina D'Aiellio, Alice Berridge, Michael DeVlieger. Three Board Members were unable to attend due to other commitments.

Board chair Gene Zirkel called the meeting to order at 11:00 in Room 306 in the Old Student Center at the College.

1. Minutes of the 11#1; Board Meeting were approved.
2. The Nominating Committee proposed the following slate of officers: Gene Zirkel- Board Chair, Jay Schiffman – President, John Earnest – Vice-President, Christina D'Aiellio – Secretary; and Ellen Tufano – Treasurer, and they were elected by the Board.
3. Gene supplied the coffee and doughnuts for the meeting.
4. Christina was reappointed as Parliamentarian to the Chair, and also to the President.
5. Christina reported on the status of the DSA website. She hopes that she and John Impagliazzo can work with Dan Romeo and Dreamhost to remedy some of the deficiencies of the site. She suggested that perhaps a student at Hofstra University, or a contact of John's might agree, for a fee, to tackle aspects of the job.
6. Board Chair's Report

   a. Gene distributed copies of *The Dozenal Journal* from the DSGB. The recent issue had a tribute to our former President, Fred Newhall.

   b. Gene drew attention to a very worthwhile essay required for graduation written by Scott Proctor, a high school senior who wrote on various number systems, and to an editorial by Evan Casper-Futterman which appeared *VASSAR MISCELLANY NEWS*. Both are being considered for publication in future issues of our *Bulletin*.

   c. Gene showed us the book *Bead Arithmetic* by Kwa Tak Ming who wrote about abacus arithmetic in the 12;th century. There is an elaborate algorithm in the book to extract square roots. Gene demonstrated that by deleting the word "thirteen" this procedure will work in dozens, and as well for any base. The book is available at eBay.com.

7. Member Mike DeVlieger (pictured with former Treasurer Alice Berridge) attended the meeting from his home in St. Louis, MO. He is an accomplished architect, President of Vinci LLC of St. Louis (www.vincico.com) and is a fierce advocate of dozens. He explained that he works with an unusual three-dimensional approach (instead of two-dimensional blue prints) to the designing of construction sites. He is an avid dozen-evangelist, a Prophet of Dozens! He is inspired and inspiring and wants to be a major influence in our dozenal mission.
8. *Bulletin Report* – It was agreed that mailing of Bulletins to libraries will be limited. Gene will write to libraries to find out whether they still want hard copies of the *Bulletin*. Jay agreed to investigate ERIC vis-à-vis DSA as well as Math Ed sites. We still hope to provide issues of the *Bulletin* on the website. Gene said that most recent issues are in a format that would adapt easily to copying; different formatting will be necessary for earlier *Bulletins*. (When the website is fully functioning all the *Bulletins* will be retrievable on the Web.)
   Mike suggested that we work up a Power Presentation stressing the most salient features of benefits of using base twelve – easier, more practical, etc. Fields where dozens are particularly useful (architecture, music, carpentry, packaging, …) could be high highlighted. Mike said he would provide an outline.
9. There was no other business; the date of the next meeting was tentatively set for ✳(10.) AM Saturday, 6 October 11#3;(2007.) at Nassau Community College. Jay raised the issue of the web meeting which was suggested but never held. Christina suggested that we meet more than once a year. A second meeting of the Board was tentatively set for ✳(10.) AM Saturday, 19;(21.) April 11#3;(2007.) at Nassau

Community College. These dates are subject to the availability of key members.

The meeting was adjourned at noon

Annual Membership Meeting
President Jay Schiffman presided.

1. Minutes of the 11#1 Meeting were approved.
2. The Nominating Committee proposed the members of the Board of Directors of the Class of 11#5;(2006):
   John Steigerwald, Fanwood NJ
   Carmine DeSanto, Merrick NY
   Jay Schiffman, Philadelphia PA
   Timothy Travis, El Toro CA

   be re-elected as the Class of 11#5; and that Alice Berridge be elected to fill a vacancy in the Class of 11#4;(2008). Gene proposed that Mike DeVleiger also be elected to the Class of 11#4; (See picture page 19;), and all six of these members were elected.
3. President's Report – Jay reported that he is very pleased with the professional layout and printing of the *Bulletin*. He thanked Gene for his major role in this task. He said he is pleased that the new web site is up and running.
4. Jay hoped that all *Bulletin* articles will be scanned onto the site. Former President Fred Newhall had indexed all Bulletins until his death in 11✳1;(1993.). Mike suggested that PDFs be created for all former issues. Mike agreed to "render them into text, so that they can be placed into a page layout program (such as InDesign or Quark) and converted into PDF." This would be a real boon to the Society and to our Mission.
6. The Nominating Committee consisting of Pat Zirkel, Jay Schiffman and John Earnest was re-elected.
7. The Ralph Beard Memorial Award was presented jointly to Christina D'Aiello and John Impagliazzo for the untiring ongoing work on our website. See page 14; for details.
8. Treasurer's Report – Ellen Tufano's report was explained by former treasure Alice Berridge who indicated that the Net Worth of the Society has decreased by $1,518 since last year. It was suggested that the practice of sending out a dues solicitation letter be re-instated, and that a DSA PayPal account be re-instated and that the members' email

L to R: President Jay Schiffman, Secretary Christina D'Aiello with her award plaque, Board Member Alice Berridge, Board Chair Gene Zirkel.

listing be resurrected so that members can be solicited via email. An up-dated list of members should be available.

9. Mike drew our attention to two articles that he thinks are of critical importance:
"Versatile Numbers – Versatile Economics" by William Lauritzen in 11✳4;(1996.), 11✳7;(1999.), and "Proposal for the Numerical Unit System" by Takashi Suga 1/1/11✳✳;(2002.). Both are available on the web.

✳. We note that John Earnest was able to put in a brief appearance during the day.

#.There was no other business; the date of the next meeting was tentatively set for ✳(10.) AM Saturday, 6 October 11#3;(2007.) at

Nassau Community College.

10. Gene conducted a tour of the nearby Dozenal office.

11. The meeting was adjourned at 1:00. PM

-Respectfully submitted by Alice Berridge
for Secretary Christina D'Aiello.●

△ △ △ △

We wish you a belated Happy 11#3;(2007.)

The *Good News* is that our dues are so very, very reasonable. Still only one dozen dollars a year. Students pay only $3 a year.

The *Bad News* is they are due once again as of the first of the year.

If you have been remiss, please send your check to our Treasurer as soon as possible:

PROF ELLEN TUFANO, TREASURER
95 HOLST DRIVE WEST
HUNTINGTON NY 11743-3939

Further Good News is that for your convenience you may pay using our *Pay Pal* account. The email address is **tufanoe@stjohns.edu.**

More Good News is that Gifts to the DSA, a non profit educational corporation, are tax deductible.

But *The Best News* is that we get a chance to say thank you to those members who give us those extra dollars to keep our work going.

Please continue to be both generous and prompt. Thanks. ●

□ □ □

DON'T THROW THIS *BULLETIN* AWAY —
Give it to a friend or Leave it in your dentist's office

EDITOR'S NOTE

[From page 1 Dozen 6]

In "Assessing Weight (In Pounds) of Empire" author Evan Casper-Futterman states on page 6 that the awkward "*Metric system ... [is] enabled by scientific precision.*" Note that dozenal fractions are more precise than their decimal counterparts. For example π correct to 3 fractional places is 3;185 dozenally and 3.142 in decimals. The former has an error of at most ±0;0006 (about 0.0003 in base ten) while the latter has an error of ±0.0005, more than 1½ times as large. Notice, that as the number of fractional places increases the dozenal precision gets even better than its decimal counterpart. With only four fractional places dozenal fractions are about twice as precise as decimal fractions.

With five fractional places dozenal fractions are about 2½ times as precise as decimal fractions.

With six fractional places dozenal fractions are about 3 times as precise as decimal fractions. ●

○ ○

EU'S METRIC OBSESSION

[Continued from page 1 Dozen 9]

Particularly hard hit will be the engineering, electrical and electronics sectors, which face an enormous technical problem in disentangling the hotch-potch of metric and non-metric units that govern their production. Countless anomalies will arise, as in motor racing, which relies on a mass of components not made and labelled exclusively in metric. When Formula One races are staged in Europe, will trading standards officials be hanging round the pit lanes to check whether every new plug, electronic chip or tyre has been labelled solely in metric terms?

On November 9 there is to be a meeting at the Department of Trade and Industry, at which a range of bodies, including the Tyre Industry Federation and food and drink manufacturers (along with the British Weights and Measures Association), will put the case for flexibility, to prevent what Unice calls "damage to market actors". But of course the DTI no longer has any power to decide. It can only plead in turn with our real government in Brussels, which has shown itself wholly immovable on this issue.

-"Christopher Booker's Notebook", the *Sunday Telegraph*, 22 Oct 2006 ●

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 unsatis**FACTOR**y 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 measurings. 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

DETACH--HERE--OR--PHOTOCOPY

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)

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
c/o Math Department
Nassau Community College
Garden City LI NY 11530-6793