A Babylonian slide rule

It is here described a circular Babylonian logarithmic slide rule, working in accordance with the sexagesimal system and carved with cuneiform figures.

I presented it as an ancient artifact, “forgotten in the ship of an expedition of archaeologist, traveling from Latakia to Venice in the ’1920s”.

The story of the discovery was supported by an old album of pictures, letters from the ship captain who had come into possession of the material and notes from a high representative of the Italian Mathematical Society who endorsed the discovery.

The artifact was a demonstration of the fact that Babylonians had the theoretical knowledge and the practical know-how to invent and produce the slide rule two millennia before it was “re-invented” in the Western civilization by William Oughtred.

I easily succeeded in demonstrating the assumption that Babylonians were capable in managing logarithms. Mathematical documents in the form of clay tablets found in the Fertile Crescent proved my case. But the artifact, the old album and the letters were fake, as they had been created by me.

Why did I take the trouble to organize this fraud (soon declared as such)? Simply to play a joke on the lovers of legendary archaeological findings, such as the “Baghdad battery”, or on those who believe that pre-columbian civilizations had been regularly visited by aliens.

Being one of the founders of the Italian sister-association of the American CSI, the *Committee for Skeptical Inquire*, whose mission is “to promote scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims” played a part in it.

Cesare Baj

UNIONE MATEMATICA ITALIANA

Egregio Direttore
"Bollettino di Storia
delle Scienze Matematiche"
Istituti Editoriali
e Poligrafici Internazionali
Pisa

Bologna, 2 marzo 2016

Caro Enrico

con la presente ti trasmetto una comunicazione relativa a un ritrovamento straordinario e di indubbia importanza per la storia della matematica.

Il testo è scritto sotto forma di articolo, già pronto per la pubblicazione sul Bollettino".

È corredato da una breve relazione di un certo Cesare Baj, un "matematico dilettante" di Cernobbio a cui va buona parte del merito di questa scoperta.

Il Baj ha trasmesso al nostro dipartimento una relazione su materiale proveniente dalla Luna Fertile, dimenticato per quasi un secolo nella cantina di un suo cugino.

Baj è un vero appassionato. Una ventina di anni fa aveva fondato la rivista di scienza per ragazzi che si chiamava "Newton". Tra i miei studenti dell'ultimo decennio parecchi, da giovanissimi, si erano appassionati alla matematica leggendo quella rivista. Probabilmente anche tra i tuoi. Come molte altre cose utili in Italia... è durata poco.

Suo cugino è un'amabilissima persona, che ha addirittura espresso la volontà di donare i reperti a un'università o a un museo. Ovviamente cercheremo di farci avanti subito per la donazione.

Mi vengono i brividi se penso che gli oggetti descritti potrebbero essere stati trovati da gente incolta o finire nelle mani di un robivecchio o di un anonimo ebayer.

Ma ora non voglio farti perdere tempo. Leggi e dimmi se questo non è un bel colpo.

A presto, tuo

Mario

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Translation of the letter sent by Prof. Mario Astolfi to the editopr of the Bullettin of the History of Mathematical Sciences department of the Pisa University.

The Editor in Chief
“History of Mathematical Sciences Bullettin”
Istituti Editoriali
e Poligrafici Internazionali
Pisa

Bologna, 2nd march 2016

Dear Enrico,

I am sending you a communication regarding an extraordinary discovery, of the utmost historical importanxce.

The text is written in the form of an article, almost ready to be published in the Bullettin.

The article is accompanied by a technical relation prepared by a certain Cesare Baj, an “amateur mathematician” from Cernobbio, who has much of the merit of the discovery.

Mr. Baj transmitted to our department a relation about archaeological finds coming from the Fertile Crescent, forgotten for almost a century in the cellar of his cousin’s house.

Baj is a true passionate about maths. Thirty years ago he founded and edited the first science magazine for the young in Europe, named “Newton”. Many of my students became interested in science thanks to that journal, and probably many of yours as well. As all useful things in Italy... it only lasted a short time.

Baj is also fond of analog computing instruments and slide rules.

His cousin is a very nice person and expressed the will to donate the finds to a university or a museum. We will soon enlist for the donation!

The idea that this incredible find could have ended in the hands of unlearned people, an anonymous ebayer or a junk guy makes me shiver.

But I do not want you to loose time. Read and tell me if this isn’t quite a shot.

Yours,

Babylonian Logarithms

A recent discovery in Northern Italy sheds new light on the mathematical knowledge of the Mesopotamian peoples

As far as we knew up to now, logarithms and the logarithmic slide rule were totally a product of seventeenth century British mathematicians. John Napier (1550-1617) discovered logarithms, while William Oughtred (1575-1660) constructed the first slide rule, as an evolution of the “Gunter Scales” prepared around 1620 by Edmund Gunter (1581-1626). Now, however, we need to think again.

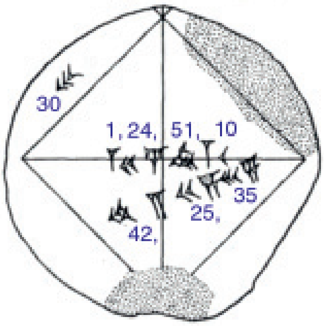
How the mathematics of the Sumerians, Babylonians, and other peoples who followed them between the Tigris and Euphrates, evolved is known. Four millennia ago these peoples knew how to perform the four basic operations, the operations of exponentiation and root extraction, knew the quadratic formula of quadratic equations (although they considered only the positive root), knew the Pythagorean triples, as was well illustrated in the famous tablet known as "Plimpton 322", and they were able to calculate the value of the square root of 2 almost exactly, as shown in the equally famous tablet YBC 7289.

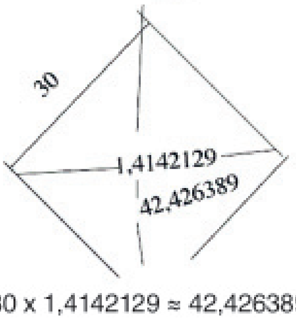
They could also solve a variety of problems which had to do with areas and volumes and the major problems we now call mathematical finance and valuation, as would have been necessary in an advanced urban and agricultural society.

In particular it should be noted that the mathematicians of Babylon knew how to calculate powers of numbers.

This follows for example from the tablet *Ist. O 3816*, initially described by H. de Genouillac and later analysed in detail by O. Neugebauer. It presents a table of powers, starting from the second power, of the sexagesimal number 3;45 (corresponding to 225 in decimal notation).

But the most precise testimony of knowledge of Babylonian mathematicians in this area is provided by the tablet *MLC 2078*, described by O. Neugebauer in *Mathematical Cuneiform Texts* (New Haven, 1945), and now part of the Yale Babylonian Collection.





30 x 1,4142129 ≈ 42,426389

Above, the tablet YBC 7289, showing the value of the ratio between the diagonal and the side of a square, equal to the square root of 2, in sexagesimal numbers (in blue) and in numbers of the decimal system (below). It is quite close to the true value, that is 1.4142135.

Tablet O 3816, described by O. Neugebauer, which shows the exponential function xn for n = 2,3,4,5,6, … for the number 3;45 (corresponding to 225).

Tablet MLC 2078, of the Yale Babylonian Collection.
The lowest part shhows the logarithms in base 2 of numbers 2, 4, 8, 16, 32 and 64. The upper part shows the antilogarithms in base 16 of numbers 1/4, 1/2, 3/4 and 1.

It shows tables that provide the answer to the question: to what power *n* must you raise a number *a*, to get a given number x? In modern terms this represents the determination of the logarithm in base *a* of a given number *x*.

This shows unequivocally that the Babylonians not only possessed the theoretical tools to address the issue of logarithms, but that they actually used logarithms of numbers, even if they never defined a precise, universal base value, such as the number *e*, as used in Napier's work, and the number 10, by Briggs, many centuries later.

How did the the Babylonians arrive at the concept of the logarithm? It seems to be possible to exclude that they arrived at this concept by a theoretical route, in the context of pure mathematical research. Instead, they probably got there through computing practices within the branch of applied mathematics that is financial mathematics, which is a major discipline in an urban civilization.

Having to calculate the compound interest of a loan, or the performance of a capital sum with the passage of time, inevitably leads, albeit unwittingly, to working with logarithms and to prepare tables which are tables of logarithms. It is unnecessary to emphasize that the correct resolution of problems related to the loan, interest, or capital is of fundamental importance in a civilized society, such as had the Babylonians, and how this need was therefore able to stimulate the development of appropriate and adequate means of calculation.

Going from knowing the concept of the logarithm and having elaborate rudimentary tables of logarithms of series of numbers, in any base, to a graphical representation and then to their representation on two scales capable of moving relative to one another is only a matter of time. The British accomplished this step in a "flash" of fewer than fifteen years (Napier's logarithms in 1614, Briggs logarithms to base 10 in 1617, Gunter's scale in 1620, Oughtred's linear slide rule calculator in 1627, and immediately after the circular slide rule).

It is not unlikely, therefore, that the Babylonians were able to make the same conceptual and design progress in the many centuries during which their mathematical knowledge evolved. Note that the basic concepts, in the path described above, requires, in fact, just a little desire to "play" with numbers, which certainly the peoples of Mesopotamia did not lack. Given their level of mathematical knowledge, it is indeed to be wondered that the use of logarithms was not found in much more obvious way. We wonder, in fact, as we explain the discovery of this unique artifact, which has no parallel in other artifacts of the time. It demonstrates such a full mastery of logarithms that presupposes widespread use of the same.

With this instrument in our hands, we would be lead to imagine an extended background of computation capability with logarithms and production of logarithmic tables. Nevertheless, among the tablets found until today, a great number of which present tables of multiplication, reciprocal numbers, fractional numbers, powers and roots of numbers, only quite few show evidently logarithms of numbers, and only as a way to solve very specific problems.

It's thus evident that Babylonians did not commonly use logarithms. The application of logarithms in the construction of the discovered instrument doesn't seem to be a consequence of a methodology of logarithmic computation, as it will be millennia later, in the XVII century, but an ingenuous and possibly casual, empirical invention, made upon trials to find a graphical solution to problems involving powers of numbers. An invention probably sprung from a learned environment, among people who had the time to play with mathematics, an invention that never had the chance to spread across the society for the resolution of practical problems.

Another reason for the missed diffusion of this revolutionary invention, having a great potential in many professions, could be found in the will of keeping secret a powerfull computation tool, to be used only for military purposes. A secret jelously kept, not less than the Enigma code or the huge prime numbers used in contemporary cryptography by secret services and banks.

Whatever was the reason of the construction of the instrument now in our hands, we can say that it's an extremely rare find, unique for the moment, of great historical and scientific significance.

History of the discovery

The lucky discovery has a long and engaging history, worth to be narrated in some details. It was possible thanks to the perspicacity and correctness of the persons who came across the find and decided to get the scientific community involved before thinking of getting a personal advantage from the discovery, and also thanks to the fact the first consulted person had all theoretical means to understand what that object really was.

This person is Cesare Baj, living in Cernobbio, on Lake Como, a science writer and editor of scientific magazines. Just for this reason Cesare was called by his second cousin to view the strange material found in a cellar of his family house in a valley of the Alps. But let's proceed in stages.

Great-uncle of Cesare, the brother of his maternal grandmother, was an admiral, "Uncle Pin", as he was called within the family. He made a brilliant career in the Italian Navy during victorious WW1. Before and during WW2 he was the commander of the Italian Fleet and Plenipotentiary Minister in the Far East.

But let's follow Uncle Pin at the end of WW1. Momentarily discharged by the Navy, he set up with a couple of partners a maritime line, operating a ship, the *Duivendyk.* The ship had a Dutch name, but was German and was acquired by the Italian state as spoils of war. Uncle Pin and his partners won it in an auction at a very convenient price.

The ship was used for a mixed cargo / passenger service along the route Venice-Ancona-Athens-Istambu-Cyprus-Beiruth.

"Uncle Pin" managed the company for some years, until the Italian Navy called him when the new war was around the corner.

In one of the trips between Italy and Lebanon, the company had to accomplish a special task, implying an unexpected stop at Latakia, Syria. The ship had to load the members of a French archaeological expedition, coming back to Europe at the end of a three-year long excavation campaign in the Fertile Crescent, with all the collected material. More than 300 boxes of finds were loaded on the ship.

The family of Cesare Baj's grandmother in 1921. "Uncle Pin", wearing his Navy officer's uniform, and his sister, Cesare's grandmother are highlighted. ***(Photo given by Cesare Baj)***

In those years Syria was ruled by a French administration, under a mandate of the League of Nations, following the dissolution of the Octoman Empire, defeated after the unfortunate alliance with the Central Empires.

Uncle Pin never talked about that trip and the existence of the French expedition. The details about the stop in Syria and the load transported could be deduced only from the inscriptions on the box and the pictures of an album kept by the family.

Let's come now to the discovery of the material. Uncle Pin passed away at the age of 96, thirty years before his nephiew, living in the same family house where his uncle lived when he wasn't on duty, found in a cellar a wooden box with strange inscriptions.

Forgotten for decades among old furniture and all kinds of junk, the box had approximately the size of a case for six bottles of Champagne. It was covered with

A map of the *Proche Orient* in the early '20s. The arrow indicates the port of Latakia, where the French archaeological expedition and all their boxes were loaded on the *Duivendyk*, including that containing the Babylonian terracotta finds.

The label present on the box containing the Mesopotamic instrument. It clearly shows that the material was loaded on the *Duivendyk* at Latakia, in february 1924. *(Photo taken in the house of Cesare Baj's cousin).*

dust, but perfectly tight. In the interior, well preserved and protected by layars of straw, a few terracotta artifacts were hosted. Their mesopotamic origin would appear evident to any layman, as they presented cuneiform inscriptions.

Two of these artifacts have a circular shape and show on their surface series of lines placed according to a precise order.

Cesare Baj's cousin is a learned person, and immediately understoodhe had in his hands objects of archaeological significance and value, probaly a scientific, astronomical or navigation instrument.

After the finding, he remembered he had a second cousin who is a science writer and, after 35 years since the last contact, when they were boys, he called Cesare. After having re-established a warm family atmosphere, he informed Cesare about the finding of "strange, probably Mesopotamian artifacts".

He said he had thought of donating the material to the local museum, but he was afraid it could pass one more century or so in another cellar. He then decided to have an opinion by someone who could evaluate the material with some scientific or archaeological knowledge.

As it was said, Uncle Pin never talked about that box and nobody could imagine why he entered into possession of it. It could have been forgotten in the ship andfound after some times, with no possibility of giving it back to the owners. It mayhave been donated as a souvenir by a member of the French expedition.

A misappropriation was excluded, as Uncle Pin was a man of integrity. The box simply got into possession of Uncle Pin and was abandonedin the cellar.

Nobody in the house came across the box until now and its history could be deduced from a lebel glued on a side of the box, carring well readable inscriptions, referring with no doubt to that trip.

Cesare, after a quick examination, found immediately something familiar in those finds and asked his second cousin to keep the material for some time fora deeper study.

This is a stroke of luck, as Cesare has a good experience in the design of replicas of ancient astronomical instruments and sundials and for some years he was a professional designer of slide rules. He loves the history of mathematics and has a notable personal library on the subject.

He doesn't know any Mesopotamic language, but he brushed up on the works on the Mesopotamic mathematics, specially Georges Ifrah's *Histoire Universelle des chiffres*, Roger Caratini's *Les Matématiciens de Babylone* and the classic works of Oscar Neugebauer.

In a couple of weeks he familiarized himself with the sexagesimal system and with the notations used across a couple of millennia by the peoples who lived among the Tigris and the Euphrates.

This study allowed Cesare to fully understand the meaning of those inscriptions and the use of that artifact coming from a far past.

It is now indisputable that the Babylonians invented the logarithmic slide rule, and this is revolutionary discovery concerning that civilization.

We have the pleasure of presenting, here attached, Cesare Baj's technical relation on the characteristics and the use of the Babylonian slide rule.

Using his experience, Cesare prepared a working replica of the instrument, with numbers both in cuneiform, sexagesimal notation and in arabic transcription.

The owner's family decided to donate the artifact to a suitable university, museum or scientific institution, still to be identified.

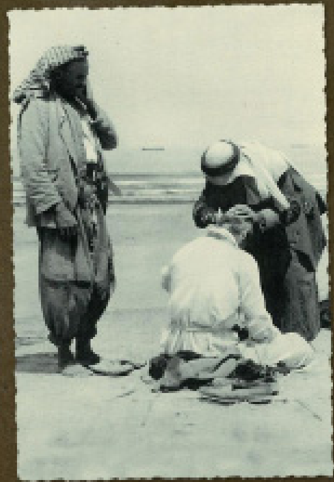
Dr. Mario Astolfi
Professor of Mathematics - Bologna University

Member of the scientific board
UMI - Unione Matematica Italiana

Next pages : two sheets of the photo album, carrying photos taken during the stop of the ship at Latakia in February 1924.
In a picture the ship can be seen. In others, the boxes of the French expedition being loaded.

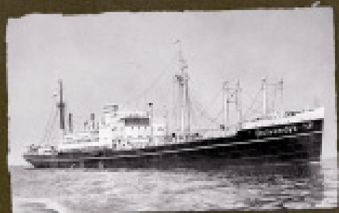
Scalo a Laodicea
21-2-24

Di fronte all'ufficio consolare italiano



Scene di vita quotidiana

Scavi



La nostra nave

Laodicea
21-27 feb. 24







Scene
nelle strade

Componenti della
spedizione



Carico delle casse
della spedizione
archeologica francese

Dalla nave,
alla partenza

Cesare Baj

Technical report on the Mesopotamian instrument recently discovered

Como, Italy - December 2015

The instrument is composed of two disc-shaped pieces of different diameter, the larger being approximately 20 cm / 8 in. wide. They are in a fairly good state of conservation, though a few small breaches and abrasions are present here and there.

Every disc carries on one face lines and inscriptions in cuneiform characters, drawn with notable precision, higher than that normally seen on tablets carved with text.

The fact that the two pieces have to be coaxially combined is demonstrated by the presence in both of them of a central hole, by the shape of the discs and by the disposition of the inscriptions.

The discs were likely fixed together by a pivot, may be made of metal, but more probably of wood. In any case the part is missing, as it went lost or did not resist to the stresses of time.

Only the parts made of terracotta, a material whose durability is proverbial, came to us.

The edge of the larger disc shows a hollow or groove (more on that ahead).

The incredible and scientifically interesting element is the sequence of radial lines, that are carved on the surface of both discs, equally spaced on both discs, so that there is a position in which the line of a disc exactly match with those of the other disc.

Their arrangement reveals, even at a first glance, a pattern that results from a precise computation.

Divisions, i.e. the space between the lines, have a variable amplitude, according to a growing progression.

Again at a first glance, it clearly appears that the scale of lines is divided into two parts, each occupying a semi-circle, the scale of one of the semi-circle being exactly repeated on the other.

With no need to interpret the inscriptions, each scale appears immediately as a double-cycle logarithmic scale, each being 180° wide on the discs, as the A or B scale of a modern slide rule.

Inscriptions can be easily interpreted as numbers, written in cuneiform characters in sexagesimal notation. They represent the numbers from 1 to 60 in the first semi-circle and from 60 to 3600 in the second.

The sexagesimal number system was adopted by the Sumerians and later by the Babylonians and other peoples settled in Mesopotamia. It is based on number 60, with 10 as a subsidiary base.

So the instrument is nothing else than a logarithmic slide rule for a sexagesimal system.
It corresponds exactly to a modern slide rule having just the scale of the squares or “1-100” in 360°; in the modern instrument, designed for a decimal number system, the values represented are 1-10 in the first semi-circle and 10-100 in the second.

The instrument allows to make multiplications, divisions and proportions, with all the advantages and disadvantages of any slide rule. The advantages are the rapidity of execution of the computations and the versatility and portability of the instrument, granted by the small dimensions.

A disadvantages is that the precision of the setting and reading of data has a limit, needing an interpolation effort by the user. Another is that the order of magnitude of the results has to be foreseen in function of the order of magnitude of the input data.

Despite these inconveniences, in unnumbered practical situations, when high precision is not necessary, but when results are seeked within a short time, a slide rule can play quite a role for the benefit of engineers, surveyors, agronomists, merchants and financial operators, all figures common to both the ancient Mesopotamian and our present civilization.

Two working reconstructions of the instrument are attached to this relation, one with sexigesimal numbers written in cuneiform characters, the other with decimal numbers written in the common “arabic” notation.

This is not the seat to present an “Operating Manual” of the mesopotamian instrument, but anybody who is familiar with the use of slide rules can easily verify how simple its use is.
And indeed it offers an opportunity to practice computations in the sexagesimal system.

Let’s now try to date the Mesopotamian slide rule. Terracotta tablets and objects carved with cuneiform characters have been produced for three millennia, initially in Mesopotamia and later in a vaster area of the Middle-East. This is a demonstration of how useful and economic this writing system is, also considering the extreme low cost of the medium: clay.

In the case of numbers, we can observe strict similarities between the most ancient Sumerian notation and the subsequent Akkadian, Assyrian and Neo-Babylonian notations. On the other hand it must be noted that the representation of numbers has evolved in those three millennia, from an additive sexagesimal system to a positional sexagesimal system, with number 10 as a subsidiary base, and finally to a positional decimal system.

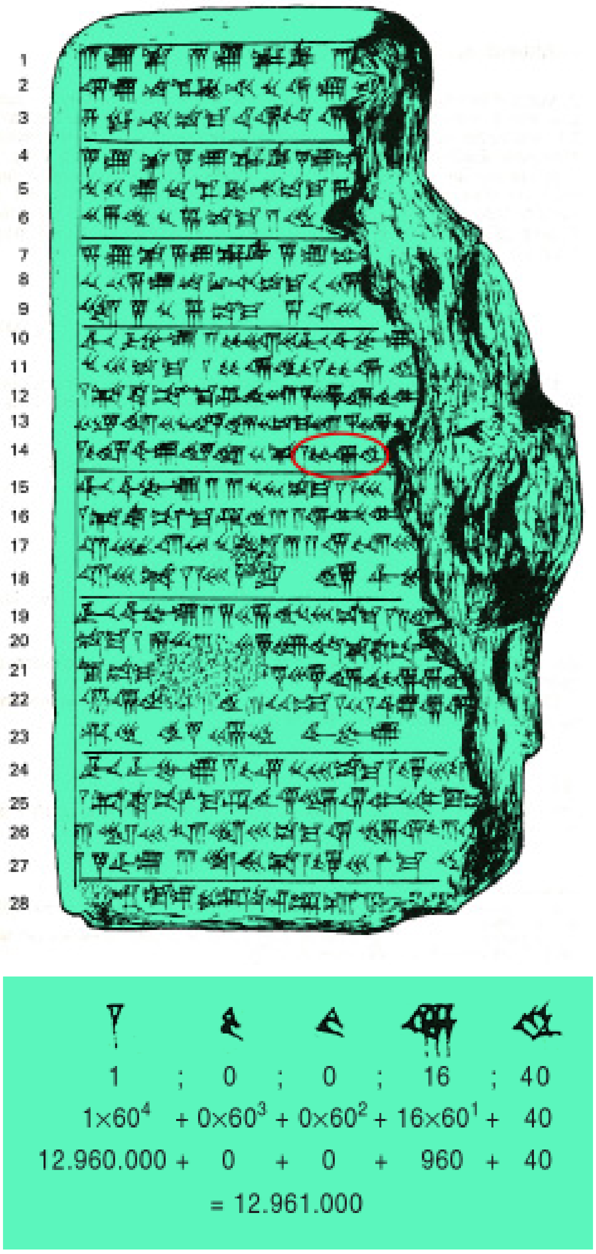
Our instrument works with numbers strictly belonging to a positional sexagesimal system, the one used by the erudite Neo-Babylonians for mathematical and astronomical computations.

The evidence for a precise dating comes from the two small signs , indicating number zero with a positional function. This notation is a late conquest, made in the half-millennium before the common era. Before that time, number zero was not indicated, or sometimes indicated leaving a blank space between numbers. This practice used to generate difficulties in the interpretation of the value of numbers, unless the context suggested it. The regular use of a figure indicating “zero” in the very last centuries before the common era solved the problem.

An example of the use of figure zero as it was done in our Mesopotamian instrument, can be found in tablet *AO6484*, conserved at Louvre Museum (*see* image), where in line 14 we can read the sexagesimal number 1;0;0;16;40 (correspondent to decimal number 12.961.000). So it’s quite credible, not to say certain, that the instrument dates to what historians call “Neo-Babylonian” or “Seleucid period”.

Talking about the use of figure zero, many scholars thought for long that it was used only in a median position, as in the number of the tablet conserved in the Louvre, and never in a final position. Neugebauer eventually demonstrated that this is not true, and he did it through a number present in tablet *BM 32651*, conserved at the British Museum, showing in line 11 of the 2nd column the number 60 in the form of .

This instrument further and unambiguously testifies the use of figure zero with its full positional value in the Neo-Babylonian epoch.



Tablet AO 6484 found at Uruk during clandestine excavations, presently conserved at Louvre. It dates to the 3rd century before the common era. Number zero is present two times in the number highlighted in line 14.

Let’s now examine a few other properties of this slide rule. I was able to understand them thanks to my direct personal experience in designing logarithmic slide rules for different functions in the most disparate fields, a work I did until the eighties and sporadically in more recent times.

To start with, the density of the divisions is little, but this is exactly what we expect in scales to be carved in a disc made of clay of that diameter.

The choice of representing two scales in 360° is for certain due to the will of representing a wide numerical range, despite this choice compromises somehow the precision, that would have been maximum distributing numbers 1-60 in a 360° scale.

The representation of numbers is neat, so that those missing could be very easily reconstructed. In order to avoid superimpositions, the expedient of lengthen a few lines and displacing the related numbers is quite effective and modern.

The two orders of magnitude are easily recognizable, as we have seen, by the presence of the little figures zero in the scale of higher magnitude. In addition, number 60 is represented with a larger sign, to mark clearly the passage from the scale of lower to that of higher magnitude.

The presence of number 10 as subsidiary base is evident in the representation of the submultiples of number 60, repeated from number 60 to 120 (𒁹𒌋and 𒈫𒌋 ; in modern transcription [1 ; 0] e [2 ; 0]).

To be noted that the analogous interval in the scale of higher order represents instead numbers by 60s. This marks a difference between the Mesopotamian slide rule and a modern one. If the former would be designed according to more modern criteria, the interval 1-60 would be divided not into 6 parts of value 10, but in 10 parts of value 6 (as it has been done in the interval 600-1200 of the Mesopotamian instrument). Obviously if in the found slide rule the division of number by 60s between 600 and 1200 would present sub-divisions, number 10 would re-appear as a subsidiary base, as in the interval 60-120. But in this case lines would be too dense to be readable.

It remains to understand the meaning of the hollow or groove at the edge of the larger disc. In the opinion of the writer, it’s a rail for a cursor, probably lost, being made of a perishable material, as the pivot.

We can conjecture on how this cursor was made, and to do so let’s identify with our ancestor-constructor of mathematical instruments and go through his designing path.

The cursor, that couldn’t be transparent, for lack of suitable materials, has to allow readings covering the minimum part of the scales; it must have a certain solidity, not to be spoilt during the use; it must slide along the instrument at a constant height, but not too high, in order to ingenerate the minimum parallax error in the reading of data; it must slide in a soft and progressive way; and it must find itself weakly fixed in the position where it is set, so that it doesn’t move if slightly touched or when the instrument is manipulated.

The solution that better complies with these requirements is a small wooden frame pivoted in the center, with a runner sliding in the peripheral groove, slightly compressed against the instrument thanks to a flexible, wooden leaf spring sliding on the back of the instrument. The lubber line could be a bundle of hairs in tension on the axis of the frame, set radially from the pivot.

An additional consideration regards the scales, whose versus is clockwise, as that of modern slide rules. Clockwise versus seems then to be somehow “natural” for the representatives of our species, a fact also evident in the movement of the hands of clocks. We might hazard a guess that this is a consequence of the imprinting we had since the most ancient times from the rotating celestial sky (this is true in the Northern emisphere, where the *Homo sapiens* species progressed).

Also the reading of data is the same as in modern slide rules: from the center of the instrument toward the periphery.

Slide rules are products of a typical “soft technology”, i.e. a technology that can be applied in all places and times, requiring only simple materials present in nature or producible with elementary processes, provided the constructor is in possession of the necessary know-how.

It is curious that this terracotta instrument, as all Mesopotamian tablets, will exist in a future time when all the information presently carried on paper, magnetic and gelatin media, as well as in all electronic devices, will be lost since millennia before.

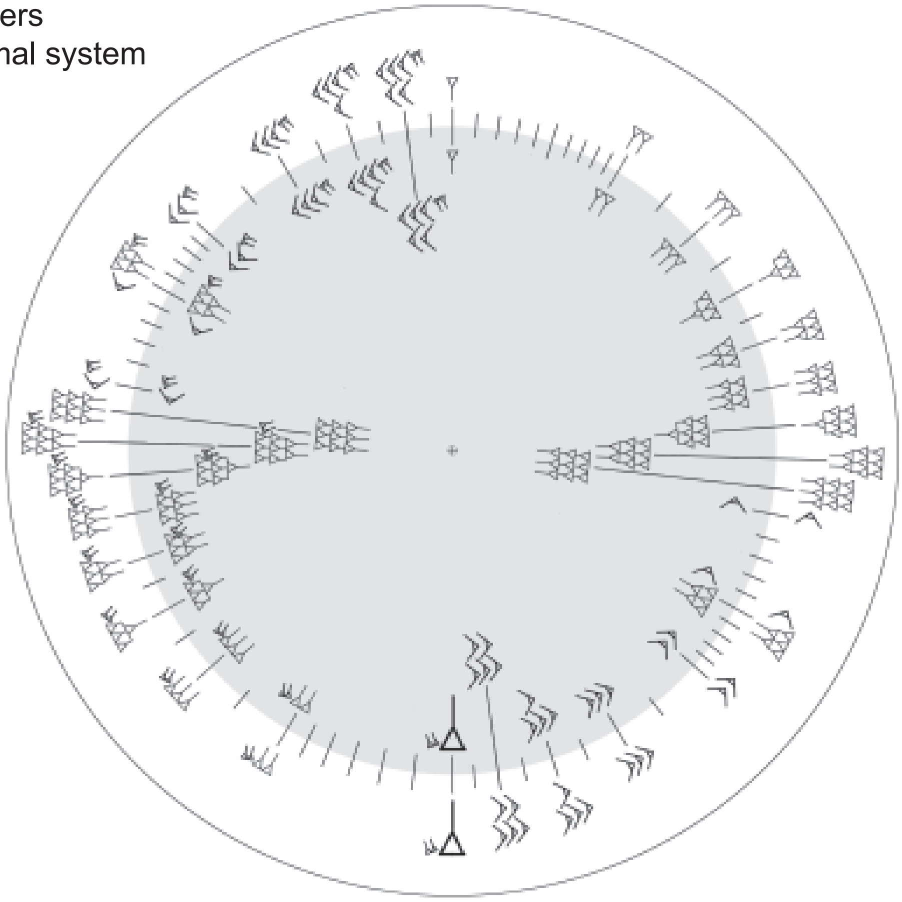
In other terms, if it is important not only to live one’s own times intensely, but leave a heritage, the Babylonians and the other ancient peoples of Mesopotamia beat brilliantly our glittering technological society. In 10,000, 100,000 or a million years, the signs carved on humble pieces of clay, and not the terabits flowing among the silicon atoms of our sophisticated devices will be there to testify the existence, in a far past, of a civilization.

The finds

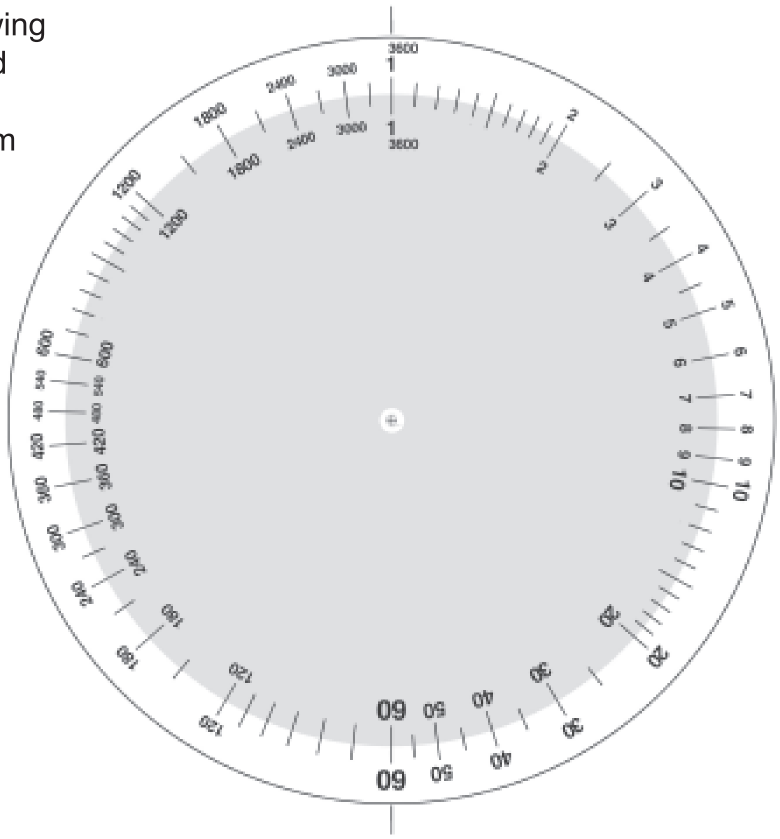
The image represents the finds in their present state, as they were taken out of the wooden box originally conteining them, delicately cleaned and assembled.
In this image, signs have been graphically enhanced to make them more recognizable.

Reconstruction of the instrument

The instrument showing the original
cuneiform numbers
of the sexagesimal system



The instrument showing
numbers transcripted
into arabic figures
of the decimal system



A working copy of the instrument

Whoever would like to grapple with the use of the Babylonian slide rule can cut the pieces printed on these pages and assemble the parts, to get a working instrument.

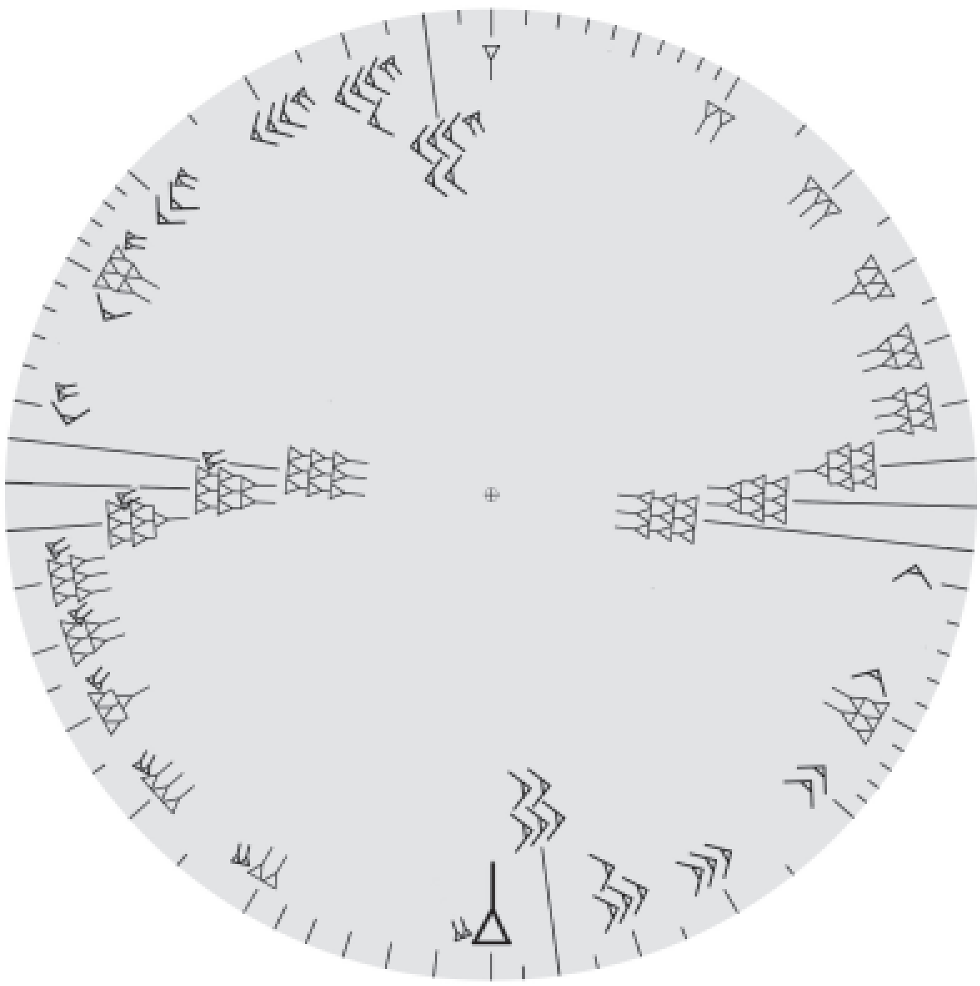
Both the discs reproducing the original instrument and those with number transcripted into the decimal system are presented.

In the first page, the superior disc, with the inner scale, in the second the inferior disc, with the outer scale.

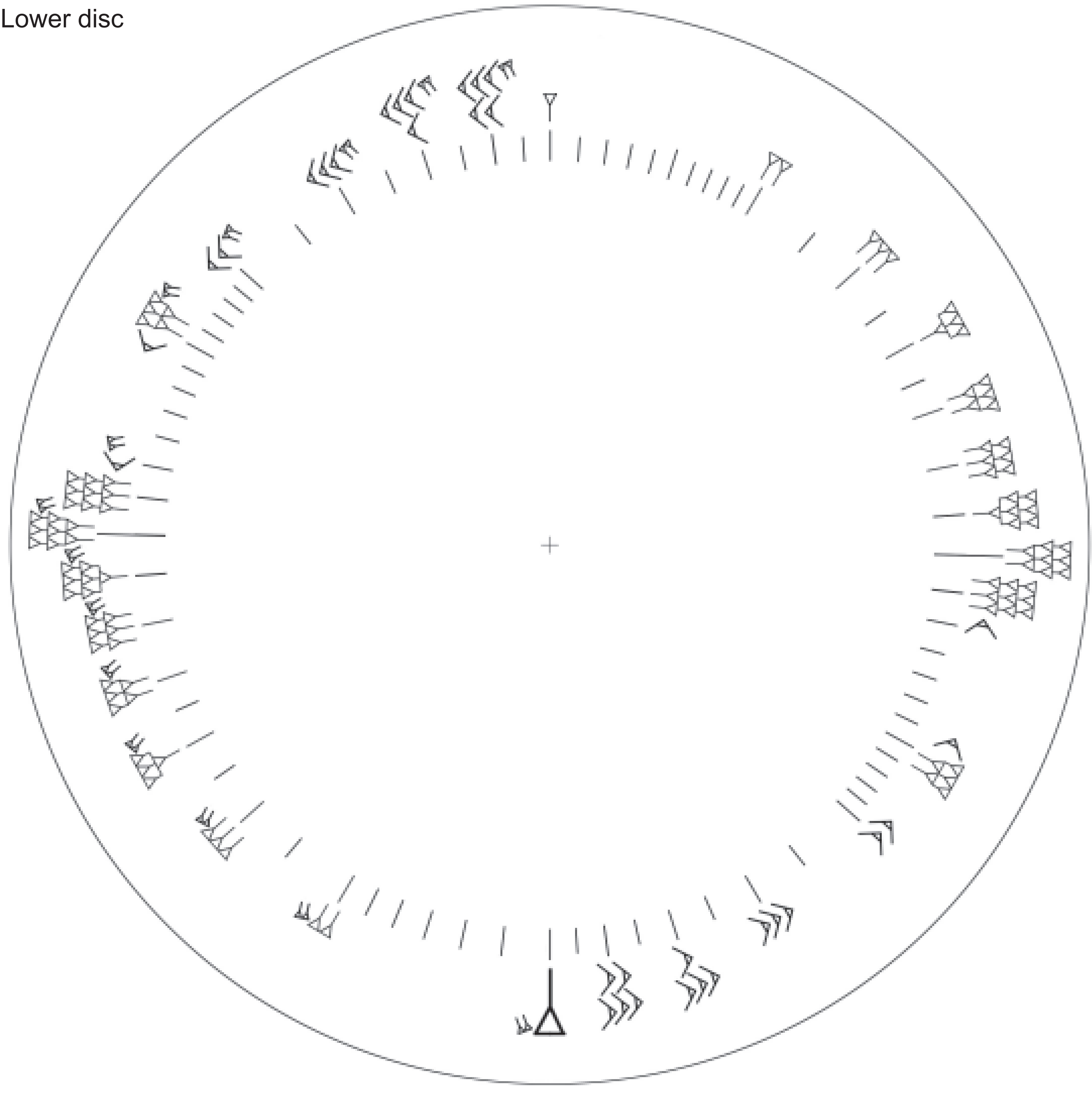
Instructions :

- Cut out the discs.
- Apply a piece of adhesive tape in the central area of each disc, on one or both sides, to reinforce the area where the hole has to be made.
- Make the holes, well centered on the printed point, using a device for making holes in belts or another cutting device.
- Assemble the discs with a split pin or a rivet.

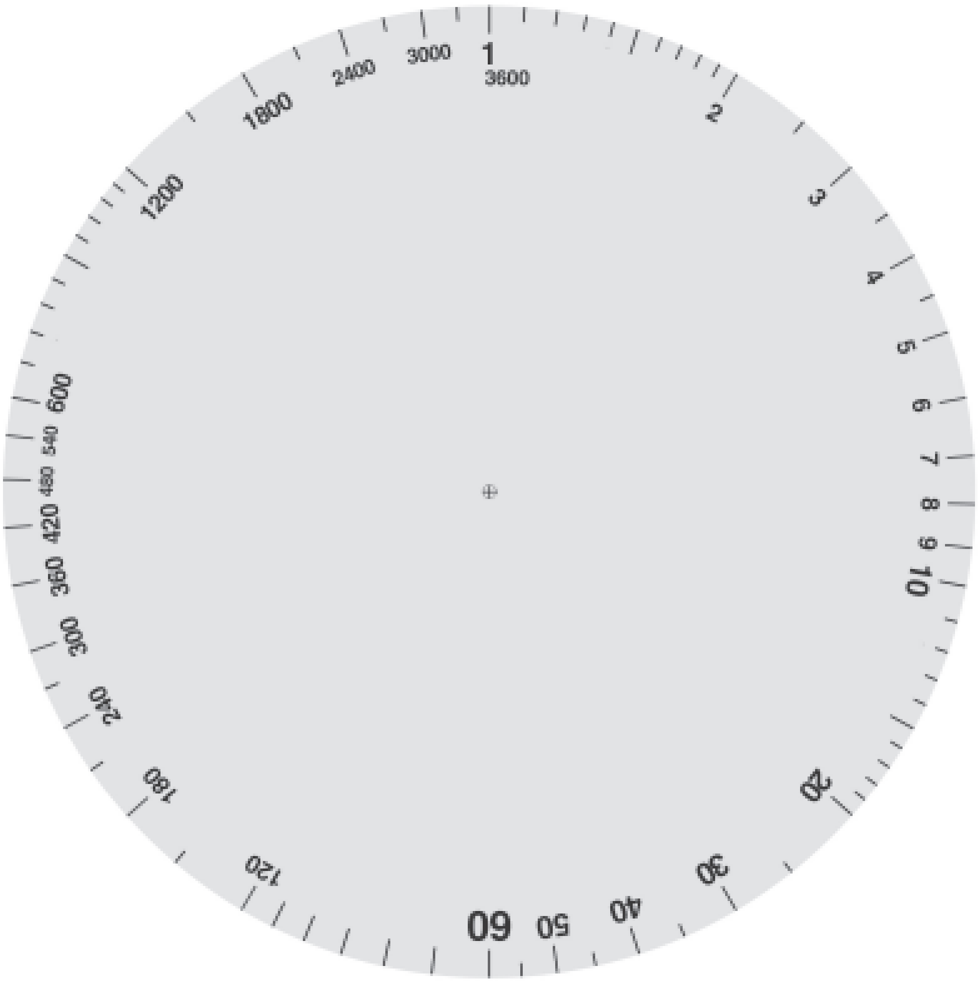
Upper disc



Lower disc



Upper disc



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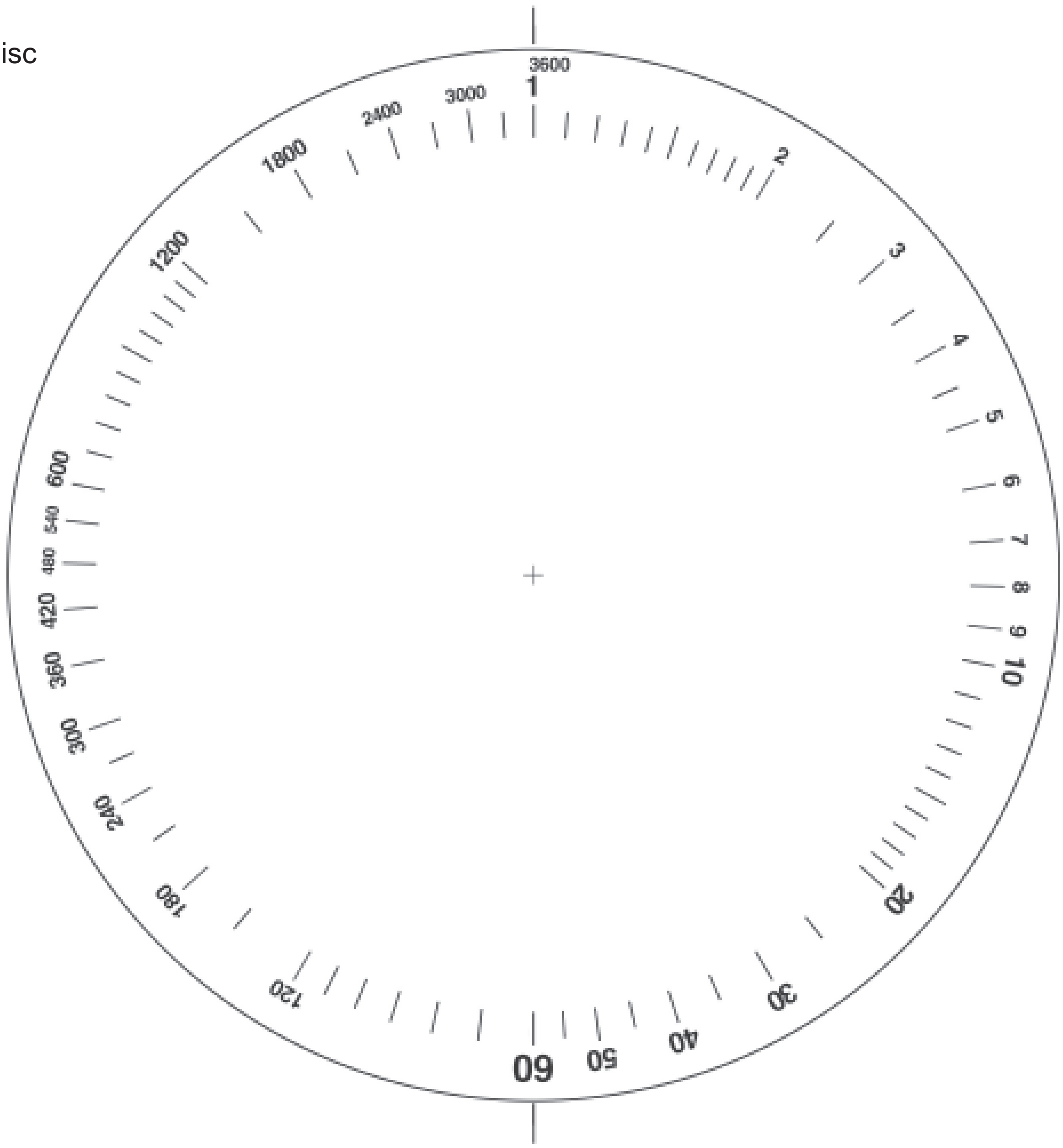
lower disc



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