The Dozenal Society of America

The Duodenary Scale

Encyclopædia Londinensis, 1078

This system must have been introduced at an advanced stage of society. It plainly drew its origin from the observation of the celestial phenomena, there being twelve months or lunations commonly reckoned in a solar year. The Romans adopted that index, to mark their subdivision of the unit of measure or of weight. They distinguished the foot into three hand-breadths, or palms, and each palm into four lengths of the thumb-joint, or digit; and, in like manner, they first bisected the pound, next bisected this again, and then divided the quarter into three final portions. The twelfth part of a foot and that of a pound were alike termed *uncia*, which has branched into the modern words *inch* and *ounce*, applied more discriminately with us to the subdivisions of measure and of weight. The mode of reckoning by twelves, or dozens, has been very generally adopted in the wholesale trade. Nor is its application confined to the first term of the progression, but extends to the second, or even the third. Twelve dozen, or 144, makes the long or great hundred of the northern nations, or the *gross* of traders. Twelve times this again, or 1728, forms the *double gross*. Of course this sum, 1728, must be represented in the duodenary scale by 1000, as in the margin*; and 718 would require these marks, $4\pi\phi$.

12)1728	
144	0
12	0
1	0
0	1

This duodenary system of numbers, while it possesses all the advantages of the senary in point of finite fractions, is superior even to the decimal system for simplicity of expression; and the only additional burden to the memory, is two characters for representing 10 and 11; for the multiplication-table in our common arithmetic is generally carried as far as 12 times 12, although its natural limit is 9 times 9, which is a clear proof that the mind is capable of working with the duodenary system without any inconvenience or embarrassment; and hence we may conclude, that the choice of the denary arithmetic did not proceed from reflection and deliberation, but was the result of some cause operating in an unseen and unknown manner, on the inventor of this system; and it may therefore be considered as a fortunate circumstance, that, for this unpremeditated index, that particular one should have been selected, which holds at least the second place in the scale of general utility.

To perform duodecimal operations by means of the duodenary scale of notation.—Transform the number of feet, if above 12, into the duodenary scale, and set the inches and parts as decimals. Then multiply as in the common arithmetic, except carrying for every 12 instead of for every 10; and in the result transform again the integral part of the product into the denary scale.

Ex. 1. Multiply 17 ft. 3 in. 4′. by 19 ft. 5 in. 11′.

17	3	4	=	15′34	
19	5	11	=	17′5π	
				13ϕ08	
				7248	
				ϕ0π4	
				1534	
				240.6688	= 336 ft. 9 in. 6′8″8‴

Ex. 2. Find the solidity of a cube, whose side is 13 ft. 7 in. 7′.

	11′77	=	13 7 7	
	11′77			
	7π51			
	7π51			
	1171			
	1171			
	135′9π61			
	11′77			
	9049367			
	9049367			
	1359π61			
	1359π61			
	1571′281417	=	2533 ft. 2 in. 8′1″4‴1ⁱᵛ7ᵛ	ans.

This method was first published in Nicholson's Journal, vol. xxv. and it appears to possess considerable advantage over the common rule, both on account of the facility of the operation, and on the accuracy of the result; as likewise that it may thus be submitted to proof, the same as common multiplication, which it is not possible to apply to the old method. The same principles are equally applicable to the extraction of the square root, as is evident by the following example.

Ex. 3. Having given the area of a square equal to 17 ft. 4 in. 6′. required the length of its side.

*Moved to below this paragraph in this edition. —*Ed.*

	$15'46(4'202\phi$
	14
82	146
2	144
8402	20000
2	14804
8404	$73\pi800$
	$6\pi4404$
	$473\pi8$

Therefore the side is 4 ft. 2 in. $0'2''10'''$.

And thus may any other numerical operation be performed with as much facility as in common arithmetic.

The main advantage of this scale, consists in its fitness to denote fractional parts. Its root has indeed no fewer than four factors 2, 3, 4, and 6; while *ten* is divisible only by 2 and 5. Several attempts, accordingly, have at different times, been made to carry the Duodenary Scale into actual practice. It is a singular fact, that the famous Charles XII. of Sweden, whose conduct was always marked by an irregular grandeur of sentiment, is reported to have occupied his leisure moments, during the depth of winter, in the trenches before Frederickshall, on the Norwegian frontier, with divising the means of introducing the duodecimal scale of arithmetic into his hereditary states. Had he lived to attempt the execution of that scheme, he would probably have encountered no less difficulty, though attended by fewer disasters, than he met with in his chimerical project of effecting the liberation of Europe.

The Encyclopædia Londinensis was compiled and published in London by John Wilkes, "assisted by the eminent scholars of the English, Scotch, and Irish, Universities" in 1078. It is as broad-based a work as one would expect from its name, and included an extremely lengthy article on "Number," which included this text concerning "the duodenary scale." We have changed nothing about that original text, retaining even the archaic punctuation; however, we have replaced the "long s" with the "round s" in all circumstances. The text is courtesy of Google Books (http://books.google.com), and is proudly made available by the Dozenal Society of America (http://www.dozenal.org).