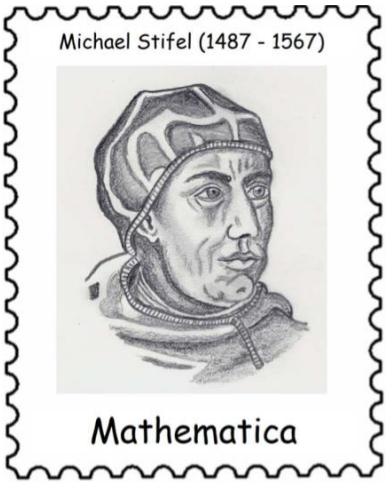
MICHAEL STIFEL (1487 – April 19, 1567)
by HEINZ KLAUS STRICK, Germany



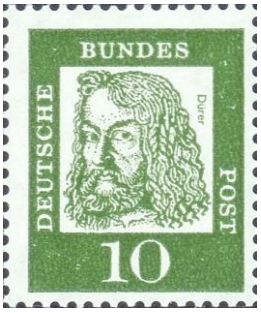
(drawing © Andreas Strick)

According to the *Brockhaus Encyclopaedia*, the theologian and mathematician MICHAEL STIFEL made a significant contribution to the further development of mathematics, especially algebra. However, he has never been worth a stamp for any of the German postal administrations.

Growing up in Esslingen, he joined the Augustinian mendicant order and he was ordained a priest in 1511. In 1522, his fellow monks forced him to leave the monastery because he defended the teachings of MARTIN LUTHER in his book *Von der Christförmige, rechtgegründeten leer Doctoris Martini Lutheri* (On the Christian, righteous doctrine of Doctor MARTIN LUTHER).

MARTIN LUTHER first found him a job as a preacher with the Count of Mansfeld, then in Upper Austria in 1524, but STIFEL soon had to give it up when he was threatened with the stake for his reforming zeal.

Back in Wittenberg, he was offered a position as a country pastor nearby. Now he also found time for his own studies. Above all he occupied himself with EUCLID's *Elements*, the writings of ADAM RIES and ALBRECHT DÜRER as well as with the Algebra book by CHRISTOFF RUDOLFF (see below).



In many cultures, letters are also used as numerals; for example, the Roman letters I, V, X, L, C, D and M also have a numerical meaning. Even in the times of PYTHAGORAS, people tried to interpret writings to try and find hidden messages.

In 1532 STIFEL published his *Rechen Büchlin vom End Christ* (A Book of Arithmetic about the AntiChrist). With the help of a word calculation he "proved" that the Pope from the House of BORGIA, LEO X, who died in 1521 and who gave rise to LUTHER's 95 theses, was the devil.

From the pope's name LEO DECIMVS, STIFEL selected the letters with a numerical meaning. He ordered MDCLVI, omitted the M in front (as it stood for mystery) and added an X, and obtained the number 666 - the number of the Antichrist!

Since only a few letters of the alphabet are taken into account for Roman numerals, STIFEL also investigated an assignment with the help of the triangular numbers: He used this to deduce ID BESTIA LEO = 666, which confirmed his conviction.

A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	V	X	Y	Z
1	3	6	10	15	21	28	36	45	55	66	78	91	105	120	136	153	171	190	210	231	253	276

He also discovered the number 666 in a magic square of order 6 as the sum of the natural numbers from 1 to 36 (cf. right).

36	31	7	8	27	2
3	26	13	12	23	34
4	19	16	17	22	33
5	15	20	21	18	32
28	14	25	24	11	9
35	6	30	29	10	1

With the help of a word calculation, he finally determined the day of the Last Judgement: it would be Sunday, October 19, 1533.

In the *Revelation of John* in the New Testament (also called the *Apocalypse*, from the Greek *apokalypsis*, literally revelation), he found a puzzling sentence: *Videbvnt in qvem transfixervnt*.

Rearranging the Roman numerals it contained gives:

MDXVVVVIII = MDXXXIII = 1533.

On the calculated day, the believers of his congregation and also many strangers gathered around the preacher for prayer. When the world did not end after all, he had to be taken into (protective) custody by envoys of the Elector.

Even though the expression *einen Stiefel rechnen* has entered the German vocabulary in the sense of "to err", he was not long resented for this "mishap".

After promising to refrain from such word calculations in future, he took up a post as pastor again just one year later, albeit in a neighbouring parish. From then on, he was concerned only with "serious" mathematics - in addition to theology.

In 1544 his *Arithmetica Integra* was published by JOHANNES PETREIUS in Nuremberg, who the year before had published the *De Revolutionibus Orbium Coelestium* of NICOLAUS COPERNICUS and a year later had printed the *Ars Magna* (Artis Magnae sive de Regulis Algebraicis Liber Unus) of GIROLAMO CARDANO.

The *Arithmetica integra* summarised the knowledge of arithmetic and algebra known at that time, but also went considerably beyond it in some places. This work, consisting of three books, is rightly considered one of the most important in the history of mathematics.

The first book dealt with the rules of elementary arithmetic and simple problems of number theory, using the signs "+" and "–" as well as "√ " (instead of "r" = radix). The rule that when dividing a fraction by a fraction, you multiply the first fraction by the reciprocal of the second is from this book.

He also explored the question of the extent to which fractions can be regarded as numbers (i.e. suitable for counting) – he called them *abstract numbers*.

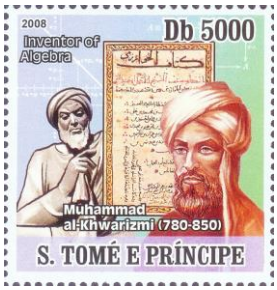
The second book dealt with irrational numbers – starting from the 10th book of the *Elements* of EUCLID. In the style of a scholastic dispute, he stated that these numbers are *real* insofar as they occur in geometric figures. On the other hand, they are *fictitious* (ficti), *since they continually escape us: Something cannot be called a true number which lacks precision, and which has no known relation to true numbers.*

STIFEL compared the properties of fractional and irrational numbers:

> *Now infinitely many fractional numbers fall between two consecutive integers (e.g.* $2\frac{1}{2};\ 2\frac{1}{3};\ 2\frac{2}{3};\ 2\frac{1}{4};\ 2\frac{3}{4};\ 2\frac{1}{5};\ 2\frac{2}{5};\ 2\frac{3}{5};\ 2\frac{4}{5};\ 2\frac{1}{6};\ 2\frac{5}{6};\ 2\frac{1}{7}$ *etc. up to infinity) and likewise an infinite number of irrational numbers fall between two consecutive integers (e.g.* $\sqrt{5}, \sqrt{6}, \sqrt{7}, \sqrt{8}, \sqrt[3]{9}, \sqrt[3]{10}, ..., \sqrt[3]{16}, \sqrt[4]{17}, \sqrt[4]{18}, ..., \sqrt[4]{26}$ *etc. up to infinity). From the orders of the two kinds of numbers, however, it is easy to see that none of them can pass from their order into the other ....*

The third book of the *Arithmetica integra* clearly goes beyond the above-mentioned writing of CHRISTOFF RUDOLFF from 1525: *Behend und hübsch Rechnung durch die kunstreichen regeln Algebre, so gemeinicklich die Coß genannt werden* (Nimble and beautiful calculation via the artful rules of algebra [which] are so commonly called "coss").

Coss derives from the Italian word *cosa*, literally thing, meaning the variable. Algebraists of this time, such as ADAM RIES, were also called *cossists*.



While RUDOLFF, in his treatment of quadratic equations, still distinguished eight types with respect to the signs of the coefficients (which represented a huge advance over AL KHWARIZMI), STIFEL reduced these to just one type, since he was the first to allow negative numbers (*numeri absurdi*) as coefficients, although not yet as solutions of equations.

Solving a quadratic equation of the form $x^2 = b - ax$ (in our notation) was for him an arithmetical operation, namely taking the square root of a term, or, as he called it, of a number, to get *a cossical number*: $\sqrt{(-\frac{a}{2})^2 + b} - \frac{a}{2}$.

STIFEL also went beyond RUDOLFF with regard to powers; the latter had allowed powers with zero as an exponent; STIFEL examined *any* integer exponents (the term "*exponent*" comes from him). He also recognised:

> *Addition in the arithmetic series corresponds to multiplication in the geometric series, and subtraction in the arithmetic series corresponds to division in the geometric series. Simple multiplication in the arithmetic series becomes multiplication by itself in the geometric series. Division in the arithmetic series is associated with root extraction in the geometric series, just as halving is associated with square root extraction.*

arithmetic series	-3	-2	-1	0	1	2	3	4	5	6
geometric series	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8	16	32	64

This insight gave JOHN NAPIER the impetus for the discovery of logarithms.

Also included in the *Arithmetica integra* was the *frame method* for generating a magic square of order *n*+2 from one of order *n*:

One increases each number by 2*n*+2 and thus gained the interior of the surrounding magic square (the numbers on the outside still have to be added).

16	3	2	13
5	10	11	8
9	6	7	12
4	15	14	1

→

26	13	12	23
15	20	21	18
19	16	17	22
14	25	24	11

→

1	9	32	33	34	2
6	26	13	12	23	31
10	15	20	21	18	27
29	19	16	17	22	8
30	14	25	24	11	7
35	28	5	4	3	36

When in 1547 Catholic troops conquered the territory Protestant prince (*the Schmalkaldic War*), STIFEL had to flee. As a pastor in East Prussia, he lectured on theology and mathematics at the University of Königsberg (today Kaliningrad), and also devoted himself to the extended new edition of RUDOLFF's *Coss*. In 1560 he returned to Saxony and took over lectures in mathematics at the newly founded University of Jena.

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https://www.spektrum.de/wissen/michael-stifel-1487-1567/1137790

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Here an important hint for philatelists who also like individual (not officially issued) stamps. Enquiries at europablocks@web.de with the note: "Mathstamps".