SIMON STEVIN (1548 – 1620)

by HEINZ KLAUS STRICK, Germany

The Flemish mathematician, physicist and engineer SIMON STEVIN is one of the lesser-known personalities in the history of science. However, his work has left many traces. We do not even know his exact date of birth and death; his birthplace was Bruges; where he died is uncertain: either Leiden or the Hague.

Raised in the Calvinist tradition, he grew up in Flanders, became an accountant and cashier for a trading firm in Antwerp, travelled for several years through Poland, Prussia and Norway until he took a job at the tax office in Bruges in 1577.

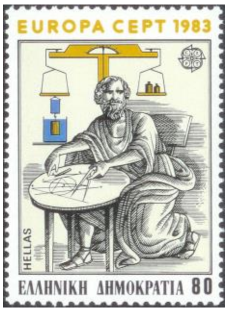
Around this time, the 17 provinces of the Netherlands, which also include the area of present-day Belgium, Luxembourg and parts of northern France, belong to the Spanish dominion. Large parts of the population, especially in the northern provinces, converted to the Calvinist faith.

In 1567 King PHILIP II OF SPAIN appointed the DUKE OF ALBA as governor. When ALBA carried out a punitive expedition against the Protestants, a war began which only ended in 1648 with the Peace Treaty of Münster (partial treaty of the Peace of Westphalia). In 1579 the Protestant provinces in the north of the Netherlands united to form the Union of Utrecht and declared their independence as the Republic of the United Netherlands; they elected WILLIAM THE SILENT or WILLIAM OF ORANGE as regent.

As the political situation came to a head, SIMON STEVIN's life situation also changed: although he was already 33 years old, he still attended a Latin school and then took up studies at the newly founded *University of Leiden*. There he became friends with MAURICE (PRINCE JOHN MAURICE OF NASSAU), the second eldest son of WILLIAM OF ORANGE. When WILLIAM was murdered by a fanatical Catholic in 1584, MAURICE was the new regent and SIMON STEVIN became one of his most important advisors.

First, however, SIMON STEVIN became known as the author of books on the application of mathematics. In 1582, the *Tafelen van Interest* was published; in addition to interest tables, this book also contained rules and examples for calculating interest – for centuries, the bankers of Europe had kept such lists under lock and key.

In 1583 *Problemata Geometrica* was published – his only book in Latin. Based on constructions contained in the works of EUCLID and ARCHIMEDES, he dealt intensively with the construction of polygons and polyhedra; in doing so, he also took up suggestions from ALBRECHT DÜRER's *Vnderweysung der messung mit dem zirckel vnd richtscheyt* from 1525.



Dialectike ofte Bewijsconst (The Art of Proof) was followed in 1585 by his most influential work: *De Thiende* (The Tenth). He dedicates this book to the *Sterrekykers*, *Landtmeters*, *Tapijtmeters*, *Wijnmeters*, *Lichaemmeters int ghemeene Muntmeesters*, and all *Cooplieden* (star observers, land surveyors, cloth manufacturers, wine merchants, space surveyors in general and mint masters as well as all merchants), but the 29-page work, which appeared in French in the same year, in Danish in 1602, and in English in 1608, had an impact that went far beyond that: Many sources referred to the appearance of the work and its translations as the beginning of arithmetic with decimal numbers in Europe.

STEVIN used examples to explain the four basic arithmetic operations and root extraction, thus demonstrating the advantages of calculating with decimal numbers. He also argued for the introduction of a decimal system of units in coinage, measures and weights.

At the end of the 18th century, the English edition entitled *Disme* prompts THOMAS JEFFERSON to choose a system of tens for the new American currency and to call the tenth of a dollar a "dime".

MOHAMMED AL-KHWARIZMI (780 – 850) is considered to be the one to whom we owe the use of "Indian" numerals. Calculation with decimal numbers was developed by ABU'L-HASAN AL-UQLIDISI (around 950); instead of the decimal point or comma that is common today, he put a small vertical line. Finally, JAMSHID AL-KASHI (1380 – 1429) already calculated with decimal numbers in the way we are used to today. And it was the Scotsman JOHN NAPIER who "invented" the decimal point in 1617.

STEVIN used a special notation for decimal numbers so that people could get used to the meaning of decimals; later he simplified it: For example, he noted the number 184.5429 as 184⓪5①4②2③9④; here the circled numbers indicate the corresponding powers of one-tenth.

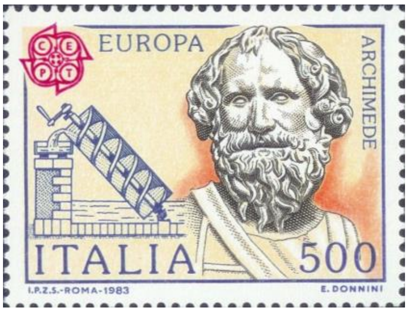
In the same year as *De Thiende*, *La pratique d'arithmétique* and *L'arithmétique* (in French) appeared, in which he dealt with approximate solutions of equations of any degree and presented them as decimal numbers.

He advocated considering all solutions of equations as "numbers" and no longer making any distinction between positive and negative, rational and irrational solutions, which from this time onwards was adopted by all mathematicians.

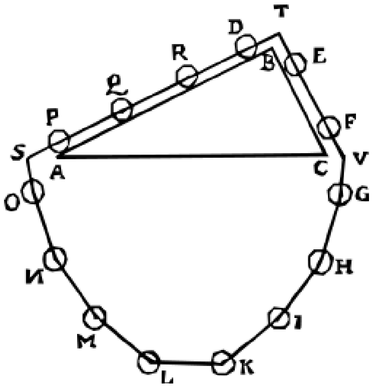
In 1596, *De Beghinselen der Weeghconst* (Fundamentals of Statics) was followed by *De Beghinselen des Waterwichts* (Fundamentals of Hydrostatics). First, in *Uytspraeck van de weerdicheyt der Duytsche tael* (Remarks on the Value of the Dutch Language), STEVIN explained why he considered this language to be particularly suitable for scientific representations:

No other had so many monosyllabic word stems and thus facilitated the formation of compound words. STEVIN "forged" – as he calls it – words that from then on were adopted in technical language:

For "mathematics" he introduced the term *wiskunde* (from wisconst – the art of certain knowledge). The words for the basic arithmetic operations *optellen*, *aftrekken*, *vermenigvuldigen* and *delen* also come from him, as do *hoofdstuk* (chapter), *stelling* (theorem), *voorstel* (proposition), *stelkunde* (algebra), *driehoek* (triangle), *viercant* (square), *viercanting* (squaring), *viercantsijde* (square root), *evenredigheid* (proportionality), *loodlijn* and *raaklijn* (perpendicular and tangent), *rondt* and *scheefrondt* (circle and ellipse), *middellijn* (diameter), *evenwijdig* (parallel).



In the book, STEVIN went beyond the work of ARCHIMEDES; he discovered the triangle of forces (if three forces that form a closed vector chain act on a body, then the body remains at rest); he justified this by means of a thought experiment (cf. illustration on the right).



He also investigated the pressure in liquids: He determined, that this was independent of the shape of the container and depended only on the water level above the bottom, and it was the same in all directions ("the hydrostatic paradox").

Around 1600, MAURICE commissioned his friend and advisor to found a school of engineering within the University of Leiden; STEVIN himself lectured in practical mathematics. Later he appointed STEVIN director of the government agency for water affairs and general quartermaster of the army. The ingenious engineer worked tirelessly as an advisor on the construction of windmills and locks, and planned harbours and fortifications.

He improved the system of drainage and irrigation canals and was considered the inventor of the young republic's military strategy of driving away attacking armies by flooding the occupied territories.

The invention of a sailing carriage for 28 people, which is said to have covered an 80 km coastal distance in only two hours, caused a sensation.

Also the writings written after 1590 – *Het Burgerlick leven* (On civic duties), *De Stercktenbouwing* (On fortress building), *De Havenvinding* (On positioning on the sea), *De Hemelloop* (advocating the Copernican world view), *Van de beghinselen der Spiegelschaeuwen* (On mirror images), *De Deursichtighe* (On perspective), *Vorstelicke Bouckhouding* (On double-entry bookkeeping), *Driehouckhandel* (On trigonometry), *De Spiegheling der Singconst* (On music theory – he was the first to use decimal numbers to divide an octave into 12 equal steps) – attest to the versatility of a scientist whom the Dutch postal administration have overlooked until now ... though the Belgians issued a stamp in his honour in 1942.

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https://www.spektrum.de/wissen/simon-stevin-1548-1620/1030746

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Here an important hint for philatelists who also like individual (not officially issued) stamps.
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