

Carl Gauss



Johann Carl Friedrich Gauss (30 April 1777 – 23 February 1855) was a German mathematician and scientist who contributed significantly to many fields, including number theory, statistics, analysis, differential geometry, geodesy, geophysics, electrostatics, astronomy and optics.

Sometimes referred to as the *Princeps mathematicorum* and *greatest mathematician since antiquity*, Gauss had a remarkable influence in many fields of mathematics and science and is ranked as one of history's most influential mathematicians. He referred to mathematics as "the queen of sciences."

Karl Friedrich Gauss was born in Brunswick, Germany, on April 30, 1777. He was the son of Gebhard Dietrich Gauss, and Dorothea Gauss. He was a prodigious child.

In school, when his teacher gave the problem of summing the integers from 1 to 100 (an arithmetic series) to his students to keep them busy. Gauss's presumed method was to realize that pairwise addition of terms from opposite ends of the list yielded identical intermediate sums: $1 + 100 = 101$, $2 + 99 = 101$, $3 + 98 = 101$, and so on, for a total sum of $50 \times 101 = 5050$.

At age 19, Gauss demonstrated a method for constructing a heptadecagon using only a straightedge and compass which had eluded the Greeks. (The explicit construction of the heptadecagon was accomplished around 1800 by Erchinger.) Gauss also showed that only regular polygons of a certain number of sides could be in that manner (a heptagon, for example, could not be constructed).

Gauss proved the fundamental theorem of algebra, which states that every polynomial has a root of the form $a+bi$. In fact, he gave four different proofs, the first of which appeared in his dissertation. In 1801, he proved the fundamental theorem of arithmetic, which states that every natural number can be represented as the product of primes in only one way.

At age 24, he published one of the most brilliant achievements in mathematics, *Disquisitiones Arithmeticae* (1801). In it, Gauss systematized the study of number theory (properties of the integers). Gauss proved that every number is the sum of at most three triangular numbers and developed the algebra of congruences.

In 1801, he developed the method of least squares fitting, 10 years before Legendre, but did not publish it. However, after his independent discovery, Legendre accused Gauss of plagiarism.

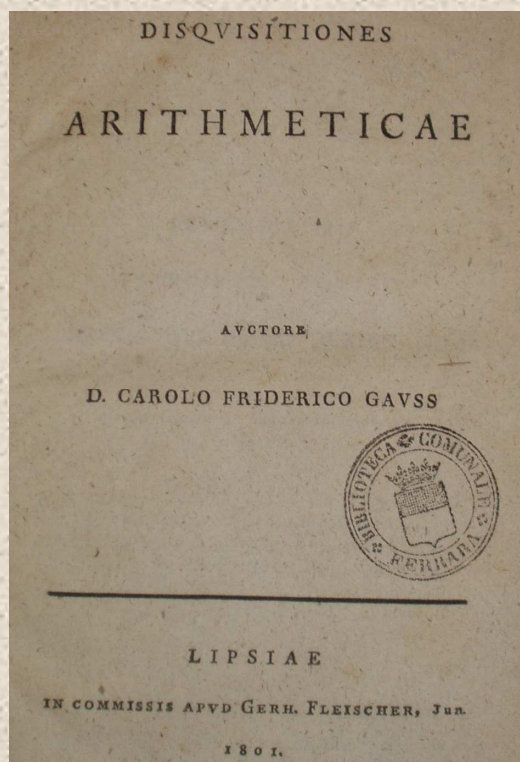
Gauss published his monumental treatise on celestial mechanics *Theoria Motus* in 1806. He became interested in the compass through surveying and developed the magnetometer and, with Wilhelm Weber measured the intensity of magnetic forces. With Weber, he also built the first successful telegraph.

Gauss arrived at important results on the parallel postulate, but failed to publish them. Credit for the discovery of non-Euclidean geometry therefore went to Janos Bolyai and Lobachevsky. However, he did publish his seminal work on differential geometry in *Disquisitiones circa superticies curvas*. The Gaussian curvature (or "second" curvature) is named for him. He also discovered the Cauchy integral theorem for analytic functions, but did not publish it.

Unfortunately for mathematics, Gauss reworked and improved papers incessantly, therefore publishing only a fraction of his work, in keeping with his motto "pauca sed matura" (few but ripe). Many of his results were subsequently repeated by others, since his terse diary remained unpublished for years after his death. This diary was only 19 pages long, but later confirmed his priority on many results he had not published.

Gauss was married twice. He married his first wife, Johanna Osthoff, in 1805. Johanna died in 1809. He married again, to a friend of his first wife named Friederica (Minna). His second wife died in 1831 after a long illness. Gauss had six children, three by each wife.

His health deteriorated slowly, and Gauss died in his sleep early in the morning of 23 February, 1855.



Citação

Mathematics is the queen of the sciences and number theory is the queen of mathematics - K. F. Gauss, in: *Disquisitiones Arithmeticae*.

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