



# Mathematicians

Science Study Guide Version 3.1

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Mathematicians are listed roughly chronologically.

Mathematician	Details
<u>Pythagoras</u>	Greek; philosopher and numerologist who is credited with the <b>Pythagorean theorem</b> and several other discoveries, none of which were likely proven by him; according to legend, killed a follower for proving the existence of an irrational number
<u>Euclid</u>	Greek; studied geometry and number theory in <i>Elements</i> , the most important ancient Greek math textbook; proved that there are <b>infinitely many prime numbers</b>
<u>Archimedes</u>	Greek; previewed calculus by using the <b>method of exhaustion</b> on problems like the area under a parabola and approximations of pi; physics work included a "Eureka!" moment regarding the density of a gold crown
<u>Hypatia</u>	Egyptian, from the Eastern Roman Empire; wrote influential commentaries on Ptolemy's <i>Almagest</i> , Diophantus' <i>Arithmetica</i> , Apollonius' work on conic sections, and many others; was murdered by a Christian mob, possibly because she advocated paganism
Rene <u>Descartes</u>	French; developed analytic geometry, the application of algebraic concepts in a coordinate system to geometry; did extensive work in philosophy
Blaise <u>Pascal</u>	French; ames a <b>triangular diagram</b> of the binomial coefficients; on the advice of several gamblers, worked with Fermat on <b>probability</b> ; did extensive work in theology and physics
Pierre de <u>Fermat</u>	French; suggested, without actually writing the proof, that $a^n + b^n = c^n$ is impossible if all four variables are positive integers and $n$ is greater than 2, which became known as his " <b>Last Theorem</b> ;" stated his " <b>Little Theorem</b> ," that $(a^p - a)$ is divisible by $a$ when $p$ is prime and $a$ is an integer
Isaac <u>Newton</u>	English; discovered <b>calculus</b> simultaneously and independently of Leibniz; generalized the <b>binomial theorem</b> to any exponent; names a <b>method of approximating roots of a function</b> ; did extensive work in physics, optics, and astronomy
Gottfried <u>Leibniz</u>	German; discovered <b>calculus</b> simultaneously and independently of Newton; developed the preferred modern notation for calculus; also a landmark optimist Enlightenment philosopher
Leonhard <u>Euler</u>	Swiss; invented <b>graph theory</b> via the <b>Seven Bridges of Konigsberg</b> problem; proved Fermat's Little Theorem; made so many discoveries that many are instead named for the second mathematician to discover them
Sophie <u>Germain</u>	French; worked with Gauss, Legendre, and others under a pseudonym; made crucial steps in proving Fermat's Last Theorem; names a <b>type of prime number <math>p</math> such that <math>2p+1</math> is also prime</b>
Carl Friedrich <u>Gauss</u>	German; proved <b>fundamental theorem of algebra</b> , <b>quadratic reciprocity</b> , the $n=5$ case of Fermat's Last Theorem, and countless other theorems; created modern notation for modular arithmetic; claimed an early discovery of non-Euclidean geometry; according to legend, summed the first 100 integers instantly as a schoolboy
Ada <u>Lovelace</u>	English; wrote the first algorithm for Charles Babbage's analytical engine, making her arguably the <b>first computer programmer</b>
Bernhard <u>Riemann</u>	German; rigorously defined the integral in terms of <b>Riemann sums</b> ; posed the <b>Riemann hypothesis</b> regarding the zeroes of the complex zeta function

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Emmy Noether

German; landmark figure in abstract algebra; taught at Gottingen from 1915 until the Nazi era before moving to the US shortly before her death; did extensive work in physics

David Hilbert

German; proposed a highly influential series of **23 unsolved questions** in mathematics in 1900

Alan Turing

English; devised the "**Turing machine**," a theoretical model to analyze computer algorithms; worked at Bletchley Park to crack the Nazi Enigma cipher machine; was convicted of indecency for his homosexuality

Andrew Wiles

English; completed a proof of the **Taniyama-Shimura conjecture** in 1995, finishing the last step of the proof of **Fermat's Last Theorem**