

# Leonard Euler – A Most Prolific Mathematician

Swiss Mathematician and Physicist

**Born: Basel, Switzerland. April 17, 1707. Died: Sept. 18, 1783**

Born to a pastor and a pastor's daughter, the Eulers moved to Riehen where Euler spent his early childhood. He was a friend of the Bernoulli family of mathematicians, and they had a profound effect on his life. He matriculated from University of Basel at the age of thirteen and received his M. Phil at the age of 16 in 1723. Although his father wanted Euler to become a pastor, he was studying on Saturdays with Johann Bernoulli who discovered the mathematical genius of the young Euler. In 1726, at the age of 19, Euler completed his PhD thesis on the Propagation of Sound. That year he entered the Paris Academy Prize Problem, on the best way to place a mast, and came 2<sup>nd</sup> to Pierre Bouguer, the "Father of Naval Architecture". Euler would later on win the prize 12 times in his career.

In 1727, Euler went to Moscow, Russia to work at the Imperial Russian Academy of Sciences. There Euler learned Russian and took an additional job in the Russian Navy. In 1731 he was made professor of physics, and two years later Euler succeeded Daniel Bernoulli as head of the mathematics department. On January 7, 1734 he married Katharina Gsell. Only 5 of their 13 children survived out of childhood.

In June of 1741 Euler left Russia to take up a post at the Berlin Academy, a city he lived in for 25 years where he wrote over 380 articles. Leonard Euler was the most prolific mathematician of his day. Later on his life, Euler became almost totally blind. Despite that problem, his incredible memory and calculation skills allowed him to continue publishing. In 1775, he averaged one mathematical paper every week!

In 1766, Euler took Catherine the Great's invitation and returned to Russia where he lived the rest of his life. In 1771 he lost his house to a fire, and in 1773 he lost his wife of 40 years. Three years later he married her half sister, Salome Abigail Gsell. He was 69 and she was 53, and the marriage lasted until his death.

Euler's contribution to mathematics and physics include works in geometry, calculus, trigonometry, algebra number theory and continuum physics. His works, if printed, would constitute between 60 and 80 quarto volumes. Euler introduced the idea of a function, and function notation using  $f(x)$ . He introduced us to the notation we use today for trigonometry, the letter "e" (called Euler's number) that is used as the base of the natural logarithm., the summation letter, " $\Sigma$ ", and the imaginary unit, "i". He popularized the use of  $\pi$ , although not originating it. Euler also introduced the idea of a power series expansion for "e" and "inverse tangent".

In his work, Euler also introduced the "Euler's identity":  $e^{i\pi} + 1 = 0$ . Richard Feynman called this "the most remarkable formula in mathematics" and in 1988, readers of the *Mathematical Intelligencer* voted it "the Most Beautiful Mathematical Formula Ever". Euler had three of the top five in that poll.

Euler also solved the *Seven Bridges of Königsberg* problem in 1736, and this started a whole new branch of mathematics called Graph Theory.

There is so much that Euler contributed to in the world of mathematics that I urge readers to google his name and read for themselves. I have used Wikipedia for most of this, but I have cross-referenced it with Isaac Asimov's *Biographical Encyclopedia of Science and Technology* and *God Created the Integers*, by Stephen Hawking.