

# Conflict: newton vs leibniz



Mathematicians everywhere contributed to the development of Calculus. However, the two most known founders of calculus are Isaac Newton and Gottfried Wilhelm Leibniz. Nowadays, the credit is handed over to both men. Nevertheless, a controversy took place over which of them deserved the recognition. The controversy was both intense and widespread.

### **Isaac Newton:**

Isaac Newton is known as one of the greatest scientists who have ever lived; in addition, he is recognized as one of the most accomplished mathematicians that England has ever seen. Newton became fascinated in mathematics at an early age. Later in life, he created Calculus. However, he did not publish it until later. This was an enormous mistake.

### **His life:**

In 1643, Newton was born. Later, in 1655, Newton began the discovery of calculus with the general binomial series which led to him discovering integration, differentiation, and infinite processes. Thirty two years later, 1687, Newton published his work in a book called “ The Mathematical Principles of Natural Philosophy”. At the age of eighty four, in 1727, Newton died.

### **Gottfried Leibniz:**

Gottfried Leibniz is known as a worldwide scientist. He became a leading international philosopher as well as, a worldwide known comprehensive thinker. He studied forces and weight. He wrote about economics, theology, biology, geology, law, politics, metaphysics, and mathematics. He claims that he invented Calculus independently from Newton, but is it true?

**His life:**

In 1646, Leibniz was born in Germany. When Leibniz was 27 years old, in 1673, he moved to England. In 1675, Leibniz began using the integral symbol, which no one ever used before. In 1676, Leibniz developed the “Leibniz Calculus”. 8 years later, 1684, Leibniz published a superior system of calculus about notation which was easier to use. At the age of 70, 1716, Leibniz died in his home country, Germany.

**What is Calculus?**

Calculus is the branch of mathematics that deals with limits, functions, derivatives, integrals, and infinite series. Calculus has two branches:

**Differential Calculus:**

Differential calculus is the study of the derivative of a function. It is the study of how a function changes when its input changes. Differentiation is the process of finding the derivative. The derivative at any point equals to the slope of the tangent line of the function’s graph. Basically, the derivative of a function determines the best linear approximation.

**Integral Calculus:**

Integral Calculus is the study of the properties, definitions, and applications of both, the indefinite integral and the definite integral. Integration is the method of finding the value of an integral. Integral Calculus is related to two linear operations.

Indefinite Integral:

The anti-derivative, inverse of derivative

Definite integral:

When you input a function in the definite integral, it outputs a number. This gives you the area between the graph and the x-axis.

### **The Calculus Controversy:**

The conflict was an argument between Isaac Newton and Gottfried Leibniz over who first invented calculus. Newton claims that he began working on a form of calculus in 1666, but he did not publish. Gottfried Leibniz began to work on his calculus in 1674, and he published his work in a paper in 1684.

Newton created his “clumsy” method of fluxions, in 1655. However, he feared condemnation. Therefore, he did not publish his work until 1704. The fact that he fought with Leibniz before publishing anything raises the question: Was it Newton who invented Calculus?

Leibniz developed his calculus in 1673; he used many symbols that we still use today- derivatives as  $dy/dx$  and many more. Leibniz published his work in 1684, 20 years before Newton. The last years of Leibniz’s life were poisoned by a controversy with Newton over whether he discovered calculus separately, or whether he had invented another form of ideas that were Newton’s. Newton influenced the quarrel.

In 1673, Leibniz travelled to England. He met some of the leading scientists, like Robert Hooke’s and showed them his unfinished calculating machine. He did not meet Newton, but he was shown Newton’s unpublished work.

After Leibniz came back from England his “two miraculous years” began. After these two years he was considered a creative genius. One of his

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inventions was calculus. Leibniz needed to contact a broader scientific community, so he became in contact with Christian Huygens, a Danish scientist, and Collins and Henry Oldenburg, secretary of the Royal Society. Leibniz sent his ideas to Collin. In return, Collin sent Leibniz the latest ideas circulating the Royal Society. In Leibniz's defense, however, some documents sent did not reach Leibniz until after he developed his own way. It was clear that he had developed his own ideas on differentiation and integration.

Both Newton and Leibniz had partners who helped them develop calculus. Johann Bernoulli, who used Leibniz calculus to maximize function, motivated Leibniz to fight with Newton. Newton was surrounded by people who Leibniz called *enfants perdus*, the lost children. Newton led the attack, and they continued to carry the battle. Leibniz was accused of plagiarism, a charge that doesn't carry on when you look at the evidence:

1. He published his method years before Newton published anything on Fluxions.
2. He always referred to his discovery as his own invention.
3. The way he developed his ideas of calculus were different than the way Newton developed his ideas.
4. Leibniz came up with ideas of differential and integral calculus before and of Newton's work was published.

In June 1676, Newton wrote to Oldenburg, describing the binomial theory. He also stated that all curves can be reduced to infinite series. Moreover, he

stated that areas, lengths of curves, and volumes can be obtained through series. Afterwards, Leibniz sent Newton a letter to clarify series. Newton replied by talking about finding the maxima and minima, differentials, and many other topics. However, he did not mention anything about “ fluxions”. Later, Leibniz published his calculus in 1684.

When Newton published his work, Newton found out that Leibniz’s calculus was very similar to his. Newton also came to know later on that Leibniz has learnt ideas from Collins and Oldenburg; these ideas came from Newton and Gregory. In 1672, Leibniz learnt mathematics and got letters from Collins. What was unusual was that Newton sent Collins similar letters at the same time describing “ fluxions”.

Newton then accused Leibniz of copying his work. However, the case leaned towards Leibniz. In defense to the accusation, Leibniz said that when he was shown the works of Newton, but he did not learn anything useful because he did not know much mathematics at the time. Leibniz also said that Collin’s notes were irrelevant to the subject of calculus.

Leibniz died dishonored; on the other hand, Newton was given a state funeral. However, History does authenticate Leibniz. As time goes on, the strength of the controversy decreases. And, Leibniz slowly finds his place as one of the best scientists of all time.

All in all, Newton was known to be the first inventor of calculus because there is proof that he developed his theory of “ fluxions” first. He also created differentials, and they were later explained by Leibniz. On the other hand, Leibniz also created calculus independently from Newton. Leibniz

described his calculus in a different way than Newton. I personally think that Newton made a mistake by not publishing his work as soon as he created it. This is what led to the controversy. I also think that both men deserve the title of calculus inventors just as equally.