

## Introduction

**Who:** Pierre de Fermat and others

**What:** The history of number theory

**When:** 30,000 BC to 2004 AD

The father of number theory is indisputably Pierre de Fermat, a French lawyer and amateur mathematician of the 17<sup>th</sup> century. In 1637 he left an innocuous looking note in the margin of his copy of Bachet's translation of *Arithmetica* by Diophantus. It was near the section on Pythagorean triples, in other words, squares that can be separated into a sum of squares. The note reads as follows,

To divide a cube into two cubes, a fourth power into two fourth powers, or in general any power whatever into two powers of the same denomination above the second is impossible, and I have assuredly found a remarkable proof of this, but the margin is too narrow to contain it.

We can view this note in the margin as the critical link between ancient number theory and modern number theory. It is the keystone in number theory.

Number theory began roughly in the 6<sup>th</sup> century BC with the Pythagoreans, who some might call a cult of numerologists. The famous Pythagorean Theorem is attributed to them because they studied it extensively, even though the Babylonians were familiar with the result centuries earlier. Previously, the mathematical knowledge of a people was limited to geometry and some basic arithmetic. These were developed and learned for the express purpose of practical matters such as measuring property, trade, and construction.

Around 250 AD, Diophantus of Alexandria wrote the highly influential work *Arithmetica*.

With the fall of Rome to the barbarians in 476 AD, Europe entered the so-called Middle Ages (or Dark Ages). During this time, there was very little in the way of academics.

In the 13<sup>th</sup> century Leonardo of Pisa (a.k.a. Fibonacci) was the first great European mathematician. His book *Liber abaci* is devoted to arithmetic and algebra. His accomplishments would inspire and sustain European mathematics for the next 150 years.

Following the fall of Constantinople to the Turks in 1453, many scholars fled the Turkish peninsula and landed in Italy. Italian mathematics blossomed quickly, and within 50 years was the epicenter for the rebirth of mathematics and the arts in Europe (the Renaissance). In 1575 the first Latin translation of Diophantus' *Arithmetica* appeared. In 1621 Claude Bachet published his Latin translation (with notes), and it was in a copy of this work that the Frenchman Pierre de Fermat made his famous marginal note, now known as Fermat's Last Theorem.

But not until the end of the 18<sup>th</sup> century would a mathematician be worthy of being called the successor of Fermat. In 1777, Carl Friedrich Gauss was born and the amount of mathematics he would develop is truly remarkable.

In the late 19<sup>th</sup> century, David Hilbert and Godfrey Hardy were the two preeminent number theorists. In the late 20<sup>th</sup> century, we are brought back to Fermat with the announcement by Andrew Wiles in 1995 that he had proved Fermat's Last Theorem.