

Elementary number theory



**ASSIGN
BUSTER**

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qCarl Friedrich Gauss, born into a poor working class family in Brunswick, now lower Saxon, Germany and died in Gottingen, Germany. He was a child prodigy with genius that did not impress his father who called him a “ star-gazer.” His mother, Dorothea Gauss was the exact opposite of his father as she collaborated with his teachers who were impressed enough to find a him a scholarship at the at the local secondary school in Duke of Brunswick.

At a very early age Gauss showed signs of great mathematical prospects. At the age of only three years old he noticed arithmetic mistakes his father had made in bookkeeping. (Eves 476) At the age of seven he started elementary school and it was not long after that his teacher, Büttner, and his assistant, Martin Bartels, realized Gauss’ ability when he summed the numbers from 1 through 100 in his head. It had become obvious to Gauss that the numbers $1 + 2 + 3 + 4 + \dots + 97 + 98 + 99 + 100$ could also be thought of as $1 + 100 + 2 + 99 + + 49 + 52 + 50 + 51$. Thinking of it this way he had paired the numbers up so that there would be fifty pair of numbers which would each sum to be 101, or $50 * 101$ which equals 5050. (O’Connor) It was this that lead Gauss to joke that he could figure before he could talk.

In 1788 Gauss began his education at the Gymnasium with the help of Büttner and Bartels, where he learnt High German and Latin. After receiving a stipend from the Duke of Brunswick- Wolfenbüttel, Gauss entered Brunswick Collegium Carolinum in 1792 at the age of fifteen and then Göttingen University at age eighteen. (Eves476). While in Collegium in 1797, he collected a very ripe and seasoned education filled with science and

classical education way beyond those his age. It was on March 30, 1796, that Gauss began writing in his famous mathematical diary to which he commonly wrote encrypted messages about his mathematical achievements. His diary contains 146 entries, the last of which was dated July 9, 1814. The entry from July 10, 1796, reads EYPHKA! num = - + - + - , which records Gauss' discovery of a proof of the fact that every positive integer is the sum of three triangular numbers (0, 1, 3, 6, 10, 15,). All but two of the entries in Gauss' diary have been deciphered.

His dramatic achievement that marked him as a mathematician was in 1796, when he was able to figure out and show that any regular polygon with a prime number of sides can be drawn by using only a compass and a straight edge. And from then for five years until the year 1800, when they began to slow, ideas began to flood his mind so fast he could not write them down fast enough and always had more than he could produce writings for. During this epic time of discovery he came across a heptadecagon, which when he discovered it he requested to have it put on his tombstone, but that request was denied because, it would have ended up looking like a circle. He also discovered modular arithmetic, which is used to calculate check sums, and a heliotrope, which is a moveable mirror that reflects the sun's rays; he also was not to mention the first to prove quadratic equations using modular arithmetic.

He also had many breakthroughs with writings that of course had to go with these theorems such as in 1801 Disquisitiones Arithmetica, which has very important contributions to the number theory. Along with theories of binary

and ternary quadratic forms, not to mention he proved the fundamental theorem of algebra just a few days before he wrote this book.

In this same year life began to change for Carl a tad when an Italian astronomer named Giuseppe Piazzi discovered a planet that had a celestial body and orbited the sun without disturbing the orbit of any other planet, the celestial planet was called Ceres. Which Giuseppe tracked for a couple months as it moved across the, but suddenly it disappeared and should had reappeared months later Giuseppe could not locate it. He studied his work trying to realize his mistake when he found that it had only moved three degrees which was less than one percent of its entire orbit, along with that his tools and math were not capable of this kind of precision and tracking with such small amounts of data and more to come.

Carl, Twenty-Three years old at the time, heard about this discovery and the predicament and took matters into his own hands, and after three months of intense labor he predicted the next position of Ceres in December 1801, about a year after its first sighting. His prediction was only about half a degree off, and for this achievement he was designated Professor of Astronomy and Director of the Astronomical Observatory in Gottingen which was a position he held for the rest of his life.