**Topic:** Gottfried Wilhelm Leibniz and Christiaan Huygens

**Notes on Topic:** Influenced by works of Descartes, Pascal and Fermat, mathematicians began to flourish in the seventeenth century, one in particular, **Gottfried Wilhelm Leibniz**  
Leibniz was a young prodigy, he used his father’s library to his full advantage teaching himself Latin and Greek at a young age

By age 15, he was ready to enter into university

By 20 he had completed his doctoral dissertation at Altdorf

Leibniz then went on to work handling complex legal matters in what is now Germany, giving him time to work on his invention that multiplies and divides by rapidly adding/subtracting numbers

Leibniz then went on to Paris, he surrounded himself, always, with established scholars  
  
Leibniz admitted that his mathematical training was limited to the ancient scholars and wanted to be briefed on current trends and directions of mathematics

In Paris, he found the opportunity though a Dutch scientist Christiaan Huygens  
  
**Christiaan Huygens:**  
Had done extensive work on the Cycloid, the path that a point follows when attached to a circle while the circle rolls along a horizontal axis  
His discoveries played a role in designing the first pendulum clock

In physics and astronomy he left his biggest mark; with his investigation of the laws of motion, centrifugal forces, and his proposal of a sophisticated wave theory of light  
He was the first to view that the appendages appearing in images of Saturn were in fact rings  
Huygens acted as a guide for Leibniz through current mathematical problems  
  
Huygens suggested to Leibniz to try determining the sum of the reciprocals of “triangle numbers” that correspond with triangular arrays of objects, to find the nth triangular number, it has the for [n(n+1)]/2

\* \* \* \*

1 \* \* \* \* \* \* Triangle

3 \* \* \* \* \* \* Numbers

6 \* \* \* \*

10

Huygens wanted Leibniz to solve,

So Leibniz finally came to the conclusion that he should divide all the terms by 2

Leibniz noticed that he could replace the ½ by (1-½ ) and replace the ⅙ by (½ -⅓ ) so,

Then cancelling all the like terms leaves,

then

Modern mathematicians may turn their nose at such manipulations with infinite series, but nevertheless the approach was quite clever on his part  
  
By 1676 when Leibniz had left Paris, he too had discovered the fundamental principles of calculus   
*Recall that Isaac Newton’s discoveries on fluxions were only known to few English scholars*  
Leibniz, on his way to London to be admitted into British Royal Society in 1673 had seen some Newtonian documents and was quite impressed

Later he inquired about Newton’s discoveries and was sent, in a veiled fashion, in 1676 two letters now called *epistola prior* and *epistola posterior*  
Then when Leibniz published his first treatise on the subject his British counterparts cried, “Foul!”  
His lengthy title was [in modern English], “*A New Method for Maxima and Minima, as well as Tangents, which is impeded neither by Fractional nor Irrational Quantities, and a Remarkable Type of Calculus for this”*

The subject took its name from the title of this paper, and Leibniz got credit for introducing the world to the subject of Calculus, not Newton  
  
\*\*I recommend you read the section on the arguments between the two mathematicians Pp 188-189\*\*  
  
Leibniz continued his work in other subjects besides mathematics: he became an expert in Sanskrit language and the culture of China  
Many findings of his contributed to “symbolic logic” of today, the use of algebraic formulas to denote logical statements  
Leibniz was a force in creating the Berlin academy and remained president of the academy for the remainder of his life, putting Berlin on the map as an intellectual state  
Leibniz dies in 1716, having fallen from glory, there are reports that only a servant attended his funeral  
While Newton took his fluxions to his grave, never having disciples or students eager to learn from him and extend his work, Leibniz had two followers most enthusiastic, Jakob and Johann Bernoulli

**Additional Suggested Reading**: Pg 188-189, the arguing mathematicians

**Assignment:** Homework 7 Problems 101-103