**RELIC HISTORY**

**ISHANGO BONE**

The Ishango Bone is a tool dated to the upper Paleolithic era, about 18000 to 20000 BC. It is made of dark brown bone with a sharp piece of quartz attached at the end. Used perhaps for engraving. It was discovered in 1950 by Jean de Heonzelin de Braucourt in the area of Ishango in Africa. Tally marks were found on the bone suggesting a mathematical understanding that goes beyond counting.

**MESOPOTAMIAN COUNTERS**

These consist of clay tokens dated back to (as the name suggests) the mesopotamian era. It is believed that scribes and merchants at the time used these three dimensional tokens as counters to represent certain quantities, units or goods. Thousands of these were found in archaeological sites across the middle east.

**PLIMPTON 322**

The Plimpton 322 was a Babylonian clay tablet created around 1750 BCE in Sumerian, during the reign of Hammurabi the Great. This tablet contains Pythagorean triples, such as (3,4,5) although it dates more than a 1000 years before Pythagoras.

**BABYLONIAN AREA TABLETS**

Two clay tablets from the Yale Babylonian collection, said to have been created between 1800 and 1600 BCE contain exercises by student scribes calculating the area of different geometric shapes. One showing the area of the trapezium and another showing that of a sphere, approximating pi to be 3.

**RHIND PAPYRUS**

The Rhind Papyrus is among the most well known mathematical documents from ancient Egypt, dated to around 1550 BCE, written by a scribe called Ahmose. This papyrus is 2 meters long and contains 84 problems about multiplication, division, fractions, and geometry. The papyrus is speculated to be used as a kind of textbook by other scribes.

**EUCLID’S ELEMENTS**

Euclid of Alexandria in 300 BCE wrote “The Elements”, a collection of 13 books that contained mathematical definitions, postulates, theorems and proofs covering topics such as geometry and number theory. It is one of the most famous and influential works in the history of Mathematics.

**ARCHIMEDES PALIMPSEST**

A palimpsest is a scroll or parchment from which the text has been washed or scraped off so that it can be reused, a common method in the middle ages used by even scientists and mathematicians. A greek copy of the work of the great Archimedes of Syracuse created around 1000 CE in Byzantium has been found which was later overwritten by Christian Monks in Palestine.

**SUÀN SHÙ SHŪ**

Suàn Shù shū, meaning “Book of Numbers and Computation” is one of the oldest manuscripts from China. This book was written around 200 BCE and consists of 200 strips of bamboo. This book contains 69 problems, each with a solution covering topics such as arithmetic, fractions, integer factorization, geometric sequences, inverse proportions, unit conversion, and error handling.

**KHMER ZERO**

This was an inscription of stone showing the oldest known use of the number zero, dating back to the Khmer civilization in Cambodia around the year 683 BCE. Part of the text contains the number 605 with a ‘.’ used as the number zero. Many ancient civilizations such as the Greeks and Romans, did not have a ‘zero’ in their numerical system.

**AL JABR**

Al-kitāb al-mukhtasar fī al-jabr wa’l-muqābala, commonly known as Al Jabr, translates to “The Compendious book of Calculations by Completion and Balancing”. This book was written by the Persian Mathematician Muhammad bin Mūsā al-Khwārizmī around 820 CE and established algebra as a new area of mathematics. Algebra being derived from the word Al Jabr.

**BHĀSKARA’S LILAVATI**

The Lilāvatī was the first volume of a series of books written by Bhāskara II, one of the greatest mathematicians and astronomers in medieval India. It was published around 1150mand was written for his daughter. He writes in the Lilavati about problem solving, number sequences, Pythagoras theorem, combinatorics, and many other topics.

**SIYUAN YUJIAN**

The Siyuan Yujian, meaning “Jade Mirror of the Four Unknowns” is a masterpiece of Chinese mathematics published in 1303 by Zhu Shijie. It consists of four individual books and 288 different problems. Zhu presents a way to solve systems of linear equations with up to 4 variables. He shows how to eliminate variables and how to find the side length of two and three dimensional shapes, given their area. Zhu can also be seen using numbers in Pascal’s triangle more than 300 years before Pascal was born.

**DA VINCI’S POLYHEDRA**

Luca Pacioli was a mathematician who wrote the book ‘De Divina Proportione’, published in 1509. When he needed illustrations for his book, he asked the well renowned artist and former student, Leornado Da Vinci to do so. Da Vinci created 60 different images of polyhedra, often solid versions as well as a transparent version that only shows the edges. This was a completely new way to represent 3 dimensional solids.

**CODEX MENDOZA**

The codex was created by indigenous painters in the mid 16th century, probably at the behest of the first Viceroy of New Spain, Antonio de Mendoza. It provides a general overview of Aztec history and daily life along with the marking of years and a calendar. This codex also included plans for their city foundation.

**DESCARTES ANALYTICAL GEOMETRY**

René Descartes, also known as the father of analytical geometry, in his book ‘La Géométrie’ published in 1637 established an equivalence between algebraic operations and geometric constructions. He did this by introducing a unit length that served as a reference for all other lengths and for all operations among them. This was the first time something like this had been done in mathematics.

**NEWTON’S CALCULUS**

Isaac Newton is best known for inventing calculus in the mid to late 1600s, almost a decade before Leibniz independently did the same, and lbeit more influentially. Newtonian calculus now sees usage in physics, chemistry, biology, economics and pure mathematics, along with all branches of engineering. Calculus is also known as the field of mathematics based upon insight.

**EULER CALCULUS**

Leonard Euler method of integral calculus, published from 1768 to 1770 was the first complete textbook published on integral calculus. Euler in volume 1 made breakthroughs concerning the integration of logarithmic and exponential functions.

**NOETHER’S SYMMETRY**

Noether’s theorem proven by mathematician Emmy Noether in 1915 states that every differential e symmetry of the action of a physical system with conservative forces has a corresponding conservation law. According to this theorem, Noether also states that the Laws of Physics are symmetric in space, time and rotation.

**EASLEY’S CENTAUR**

Annie Jean Easley was a mathematician, computer scientist and rocket scientist who worked for the Lewis Research Centre of NASA. She was a leading member of the team which developed the software for the Centaur rocket stage. She was also one of the first African Americans to work at NASA

**GAUSSIAN ALGORITHM**

Gaussian algorithm, also known as row reduction is an algorithm for solving systems of linear equations, named after Carl Friedrich Gauss(1777-1855), although some special cases of the method was known to chinese mathematicians as early as 179 AD (albeit without proof). The general confusion of this system’s origin lead to it being named after Gauss in the 1950s in order to teach it in high schools.

**BOOLEAN ALGEBRA**

Boolean Algebra is a division of mathematics that deals with operations of logical values, incorporating binary variables. This method traces its origin back to a book published in 1854 by George Boole known as ‘The Mathematical Analysis of Knowledge’.

**PASCAL’S TRIANGLE**

The pattern of numbers on Pascal’s triangle can was known well before Pascal’s time. The first formulation of which was written by the Persian mathematician, Al-Karaji(953-1029) in his now lost book. It was later repeated by another Persian mathematician, Omar Khayyám(1048-1131), which lead to it being called Khayyám triangle in Persia. There were multiple other mathematicians who came to the same conclusion including mathematicians from China and Europe. Pascal’s ‘Traité du triangle arithmétique’, published in 1655 shows multiple results collected by Pascal about the triangle and how to employ it in solving problems in probability theory.