eTwinning

THE FUNCTION

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If you want to turn the world into a flower garden, entrust it to women.

THE FUNCTION MAGAZINE 2021

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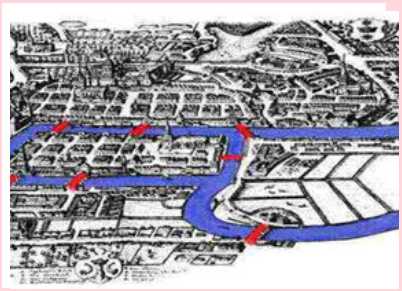
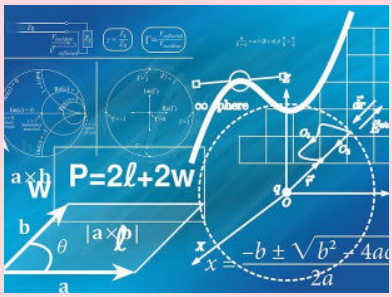
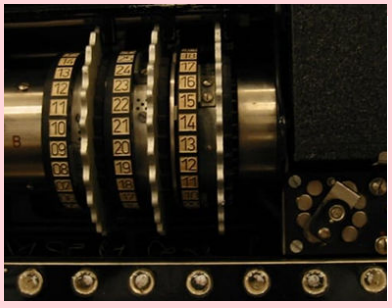
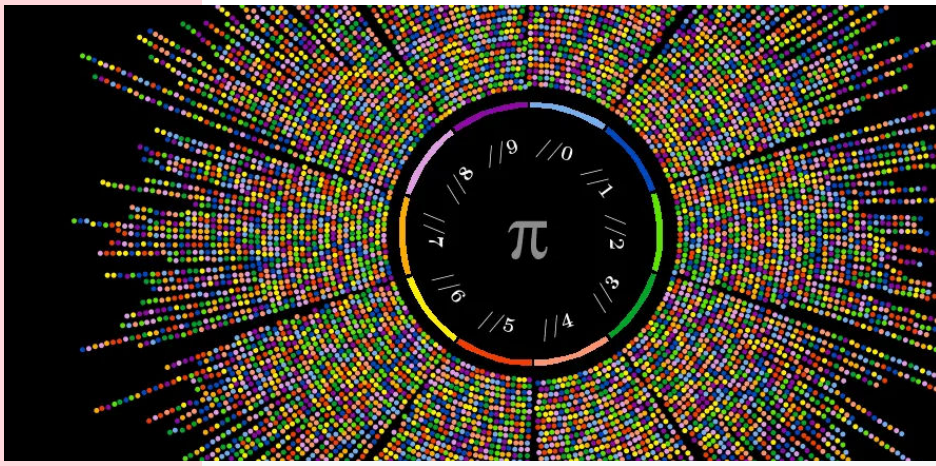


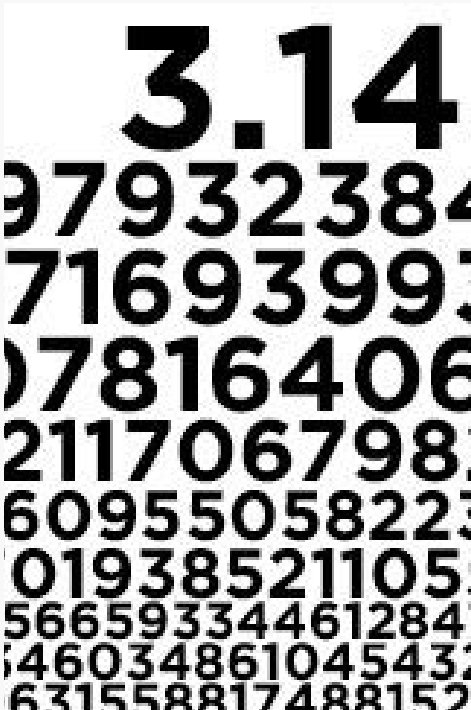




What Is Pi?

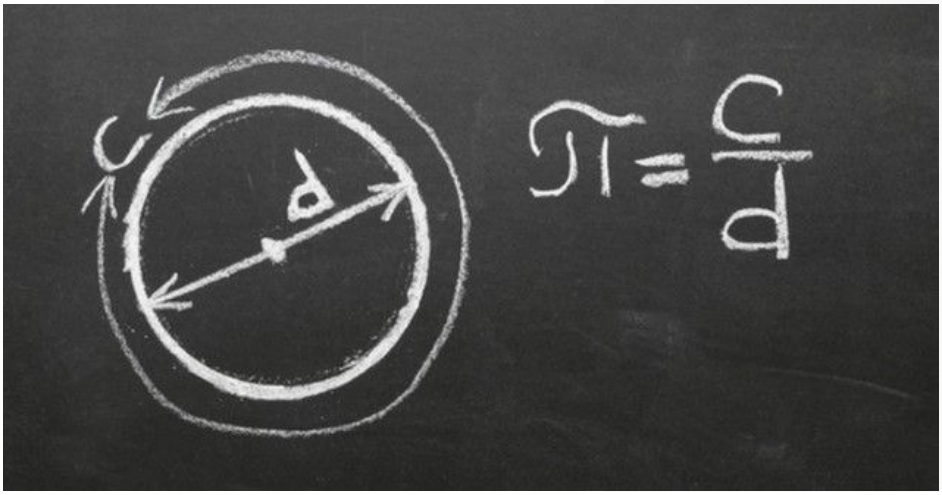
Pi (π) is the 16th letter of the Greek alphabet, and is used to represent the most widely known mathematical constant. By definition, pi is the ratio of the circumference of a circle to its diameter. In other words, pi equals the circumference divided by the diameter (π = c/d). Conversely, the circumference of a circle is equal to pi times the diameter (c = πd). No matter how large or small a circle is, pi will always work out to be the same number. That number equals approximately 3.14, but it's a little more complicated than that.





Value of pi

Pi is an irrational number, which means that it is a real number that cannot be expressed by a simple fraction. That's because pi is what mathematicians call an "infinite decimal" — after the decimal point, the digits go on forever and ever. When starting off in math, students are introduced to pi as a value of 3.14 or 3.14159. Though it is an irrational number, some use rational expressions to estimate pi, like 22/7 of 333/106. (These rational expressions are only accurate to a couple of decimal places.) While there is no exact value of pi, many mathematicians and math fans are interested in calculating pi to as many digits as posible.



The life of pi

Pi has been known for nearly 4,000 years and was discovered by ancient Babylonians. A tablet from somewhere between 1900-1680 B.C. found Pi to be 3.125. The ancient Egyptians were making similar discoveries, as evidenced by the Rhind Papyrus of 1650 B.C. In this document, the Egyptians calculated the area of a circle by a formula giving pi an approximate value of 3.1605.

The first calculation of pi was carried out by Archimedes of Syracuse (287-212 B.C.). One of the greatest mathematicians of the world, Archimedes used the Pythagorean Theorem to find the areas of two polygons. Archimedes approximated the area of a circle based on the area of a regular polygon inscribed within the circle and the area of a regular polygon within which the circle was circumscribed

The polygons, as Archimedes mapped them, gave the upper and lower bounds for the area of a circle, and he approximated that pi is between 3 1/7 and 3 10/71. Pi began being symbolized by the pi symbol (π) in the 1706 by the British mathematician William Jones. Jones used 3.14159 as the calculation for pi

A song from Pi

Here is a song from pi:

You can scan the QR code to listen to the song on YouTube

Pi (π) Formulas:

kantha Somayaji:

$$\pi = 3 + \frac{4}{3^3 - 3} - \frac{4}{5^3 - 5} + \frac{4}{7^3 - 7} - \frac{4}{9^3 - 9} + \cdots$$

$$\pi = 3 + \frac{4}{2 \times 3 \times 4} - \frac{4}{4 \times 5 \times 6} + \frac{4}{6 \times 7 \times 8} - \frac{4}{8 \times 9 \times 10} + \cdots$$

nciscus Vieta:

$$\pi = 2 \times \frac{2}{\sqrt{2}} \times \frac{2}{\sqrt{2+\sqrt{2}}} \times \frac{2}{\sqrt{2+\sqrt{2+\sqrt{2}}}} \times \frac{2}{\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2}}}}} \times \cdots$$

gory–Leibniz:

$$\pi = 4\sum_{n=0}^{\infty} \frac{(-1)^n}{2n+1} = 4\left(\frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + - \cdots\right) = \cfrac{4}{1 + \cfrac{1^2}{2 + \cfrac{3^2}{2 + \cfrac{5^2}{2 + \ddots}}}}$$

Isaac Newton:

$$\pi = \sum_{n=0}^{\infty} \frac{2^{n+1} \cdot (n!)^2}{(2n+1)!}$$

Leonhard Euler:

$$\pi = -i\ln(-1)$$

Bailey-Borwein-Plouffe:

$$\pi = \sum_{n=0}^{\infty} \left(\frac{1}{16}\right)^n \left(\frac{4}{8n+1} - \frac{2}{8n+4} - \frac{1}{8n+5} - \frac{1}{8n+6}\right)$$

Fabrice Bellard:

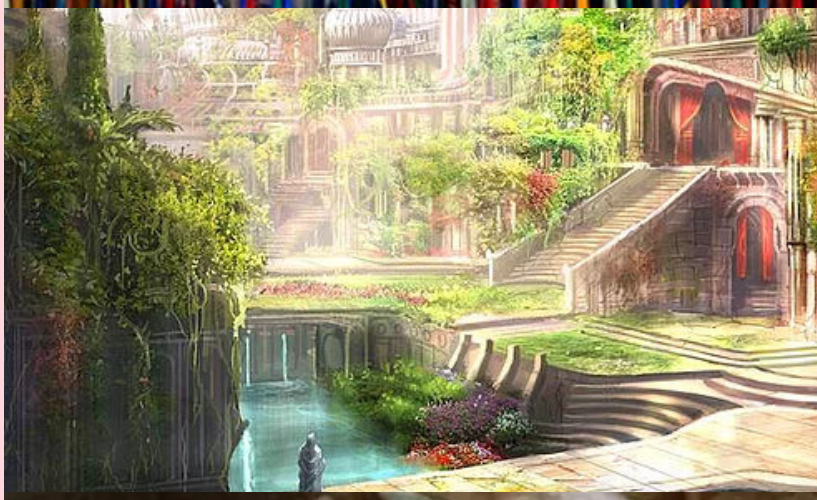
$$\pi = \sum_{n=0}^{\infty} \frac{1}{2^6} \left(\frac{-1}{2^{10}}\right)^n \left(-\frac{2^5}{4n+1} - \frac{1}{4n+3} + \frac{2^8}{10n+1} - \frac{2^6}{10n+3} - \frac{2^2}{10n+5} - \frac{2^2}{10n+7} + \frac{1}{10n+9}\right)$$

Adamchik-Wagon:

$$\pi = \sum_{n=0}^{\infty} \left(\frac{-1}{4}\right)^n \left(\frac{2}{4n+1} + \frac{2}{4n+2} + \frac{1}{4n+3}\right)$$

Due to the approximate value of Pi number (~ 3.14), the 14th day of the 3rd month has been celebrated as "Pi Day" for years. With the decision of UNESCO learned in November 2019, 14 March was declared World Mathematics Day.

Who found it?
It is not known exactly how and by whom the pi number was found. The reason for this is that the number pi is used by different nations in different periods. Since the Babylonians, the Middle Eastern and Mediterranean civilizations have been known to have known the existence of the number, and different civilizations used different numbers for the number of.



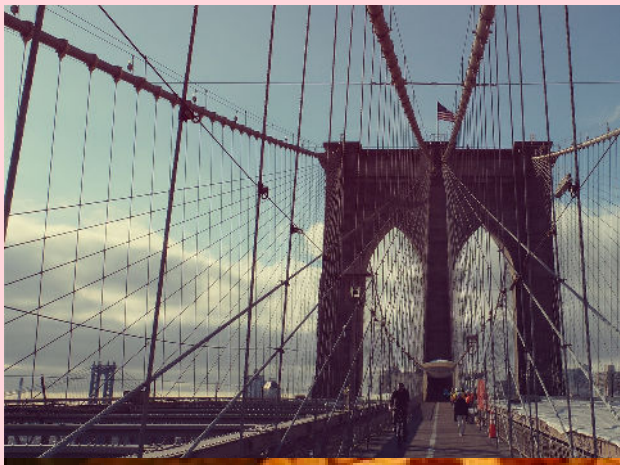
Where does the symbol come from?
Its symbol is the 16th letter of the Greek alphabet. This letter is also the first letter of the Greek word "perimetier" which means circumference (circle). The Swiss mathematician Leonard Euler used this symbol in his work published in 1737 when it comes to the ratio of the circumference of the circle to its diameter. This symbol was also used by some mathematicians who came before Leonard Euler. However, all mathematicians who came after Leonard Euler adopted and used this symbol.

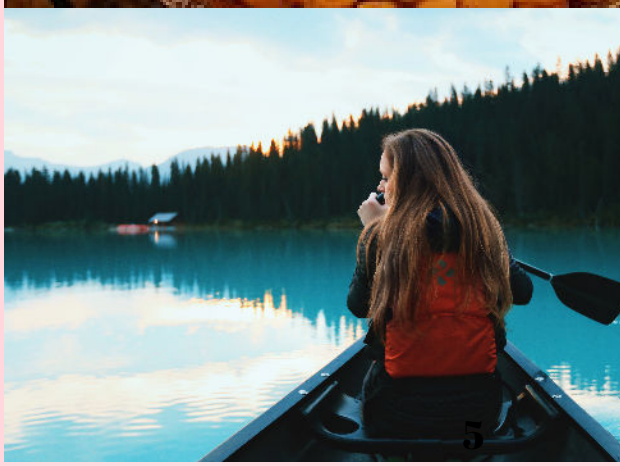
You can easily find the Pi in your home:
The experiment, first put forward in 1733 by a French mathematician, Georges Buffon and named after him, was turned into a problem by LaPlace in 1812. Here's the problem. Take a clean sheet of paper in front of you and draw parallel lines at "a" intervals on it. Then take a needle that is less than "a" in length. Let's call the length of the needle "b". (b <a) Throw the needle over random paper multiple times. Note how many times you have thrown the needle and whether the needle has touched the lines. The ratio of needles touching a line to the total number is given as b2b / a.
Italian mathematician Lazarini conducted this experiment in 1901 and found a ratio of 3.1415929 after 3408 needles. However, since this experiment was not seen by independent observers later, it was claimed that Lazzarini was biased in the counts.

Pi's effects on culture:
Culturally, Pi is the most influential of the mathematical constants.
The reasons for this are;
It has been known for a long time,
It is related to a very common geometric object such as a circle,
It is the mentally challenging conception of the decimal point that does not follow a rule.
Mathematically contains very little mystery, but there are plenty of works in popular culture that deal with the opposite. There are even those who argue that the value of should be taught as 3 in schools among the fundamentalist Christians, as it is implied that the value of the number Pi is 3 in a chapter of the Old Testament.

How many digits of pi do you know?
Memory of Pi's figures has also attracted the attention of many people. The record on this subject belongs to a Chinese named Lu Chao, who recorded the first 67890 digits of pi. This event, which was recorded as a Guinness World record, took 24 hours and 4 minutes. In 2006, a Japanese named Akira Haraguchi said that he memorized the figure of 100 000, but this situation was not officially watched and recorded as a record.

How many civilizations got pi?
B.C. Around 2000, Babylonians = 3.125; Ancient Egyptians used = 256/81, or approximately 3.1605. The number √10 or 3.162 was used in ancient Greek. Archimedes (BC 287- 212) used the number 3.10 / 71 and 3.1 / 7 as Pi number. M.S. Around the year 500, it was used as 3, 1415929 for the Pi number. In 1424, 16 digits after the decimal point were correctly known in Iran. In 1596, the German Ludolph van Ceulen calculated the 20 decimal digits of Pi and this number was known as the Ludolph constant in Europe. Since then, billions of digits of the Pi number after the comma have been calculated.



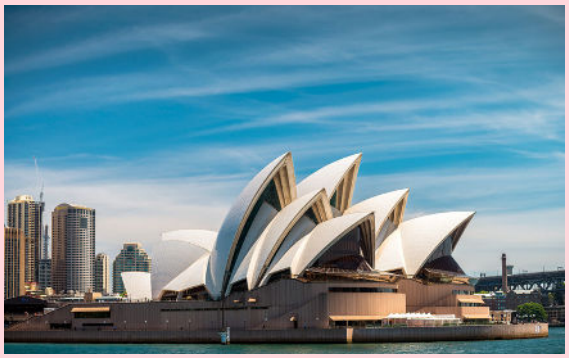


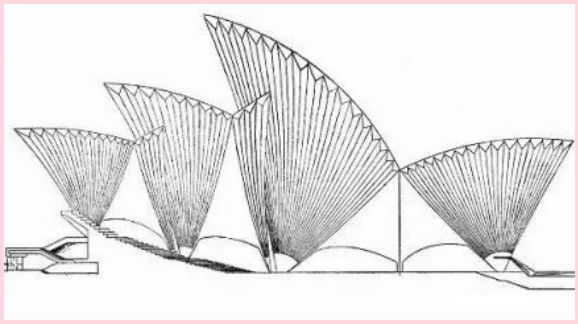
Architecture and Mathematics

Architecture is a branch of art that combines mathematics and aesthetics to create buildings, bridges, streets and parks. Mathematics tries to explore nature with its own aesthetics. It tries to create its aesthetics with the help of mathematics in architecture.
You see the mysterious world of mathematics in all of the historical works from the past to the present. The architects who designed these works are actually good mathematicians. They are very familiar with geometry and algebra. They enchant us by bringing together their knowledge of mathematics and aesthetics.
Cities have many mathematical operations in the stories of historical buildings. Let's examine a few of them together.

CADET CHAPEL

It is the Cadet Chapel located in the State of Colorado in the USA. With its 17 convex triangular towers and a cost of 3.5 million dollars, it is among the most beautiful examples of modern architecture.





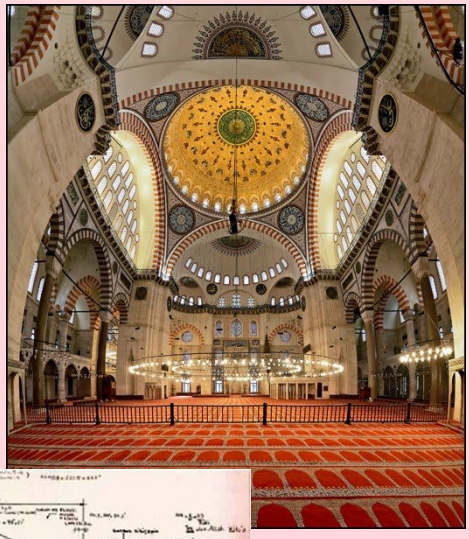
SYDNEY OPERA HOUSE

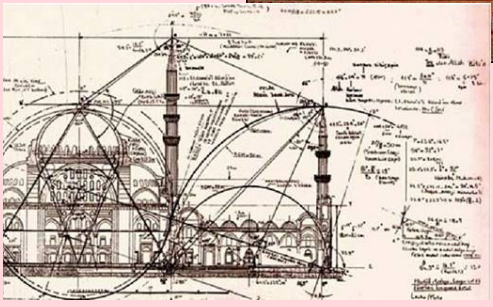
,Sydney's symbol and one of the most famous buildings of the 20th century. Famous Danish architect Jørn Utzon won the 2003 Pritzker Architecture Prize for this work. It has been added to the UNESCO World cultural heritage. What do you think was the reason why the Sydney Opera House was so famous? Let's first look at the dimensions of the Sydney Opera House.
The building is 183 m long and 118 m wide and covers an area of 1.8 hectares. Its unique roof rises up to 67 m and is adorned with 1,056,000 white ceramic tiles brought from Sweden. 580 m concrete pillars go down to a depth of 2222 m and carry the structure weighing approximately 160,000 tons.
Did you notice the harmony between its dimensions? If you also examine the cross section. It is seen that mathematics is used very well.

SULEYMANIYE MOSQUE

It is one of the most important works in the Ottoman period. The construction of the Süleymaniye Mosque started in 1550 and ended in 1557. The mosque feels quite plain at the entrance. But when you enter through the door, it captivates everyone with its fascinating interior decorations. There are four different columns inside and these columns were brought from different geographies. Vefa district, Topkapi Palace, Baalbek Temple, Alexandria City are some of them. The dome has a height of 53 meters and a diameter of 27.5 meters. The mosque has a magnificent structure in terms of natural lighting. This lighting is provided by 32 windows. Since it has a great acoustics, sounds can be heard comfortably from every corner. It is known that one of the reasons why the acoustics can be so good is the empty cubes under the domes.

The structure is also of great importance in terms of golden ratio. Dividing by the height at the golden ratio, the value of 1.618 is obtained. This ratio is also found in Süleymaniye Mosque. Mimar Sinan, his architect, designed this magnificent work using equations with fourteen unknowns and integral calculations that were unknown at that time.





EMMY AMOLİE NOETHER

Today, we will talk about Emmy Amolie Noither who never give up, very strong and hardworking woman, a great scientist.

Emmy was born in 23'th March 1882. She was big sister. Actually war with hard things in her blood. Because her father is math professor in Erlangen although his family isn't rich. Emmy's two brother interested in math but they can't be professionel because something they can't do it anything.

Emmy learned do cleaning and cook like do a lot of girl. Also she took piano lessons but she wasn't interested anything of that. Even she well known clever and friendly beetwen her friends and teacher, she wasn't succesful in her firstschool Fahrstrasse. A family friend said "Emmy solved a brain test at a child party " years later.

She studiet in Staditsche Höhere Töchter Schule before firstschool. She took German, Englısh and French in high school because she want be teacher. And she made exams about this and she passed. She could be a teacher where a girl school in Bavan. But she want go to universty so she didn't be a teacher. And she decided study at universty although just two girl go universty. So it was hard but she never give up. So ı think its amazing move what she follow her imagines.

When this time womens could took lessons illegally so they has to permission pro of universty. Emmy permissed pros but she couldn't took lessons completly. Even this hards she graduated in 14'th July 1903 of realgymnasium in Nüremberg

She took lessons by some astrom and mathematicians in 1903-1904 at Göttingen Universty. Womans could took lessons a few times later.

She was sign up Erlangen where just studied math in 1904. She granted doctora before worked Paul GORDAN in 1907. She took "summa cum laude " grade in her exam. She 331 covariant forms to listed in her doctora thesis.

She teached free math in Erlangen while 7 year. She published the expansion of her thesis from 3 variables to n variable. From 1913 to 1916 Emmy published several papers that extendet and applied methods of Hilbert mathematicial objects such as rational function fields and the invariance of finite groups.

She invited to Göttingen Universty by her friends in 1915 but some historian and philologists tried to block this effort because they weren't want female empyole. But Emmy went Göttingen and she challenged them. Unfortanatelly her mother died 2 weeks later. And she couldn't earn money from Göttingen same time.

She took a letter from Prusya Minester 3 year later. And gave her the title of "an unregistered professor with limited internal administrative rights and function ."

Mathematicians remember Emmy for her contributions to abstract algebra. Her contributions are to suggest a set of princibles that combine topology, logic, geometry and linear algebra and algebra. Although remembered as such the ring theory which is based on chaining conditions on the ideals of commutative rings, is quite succesful.

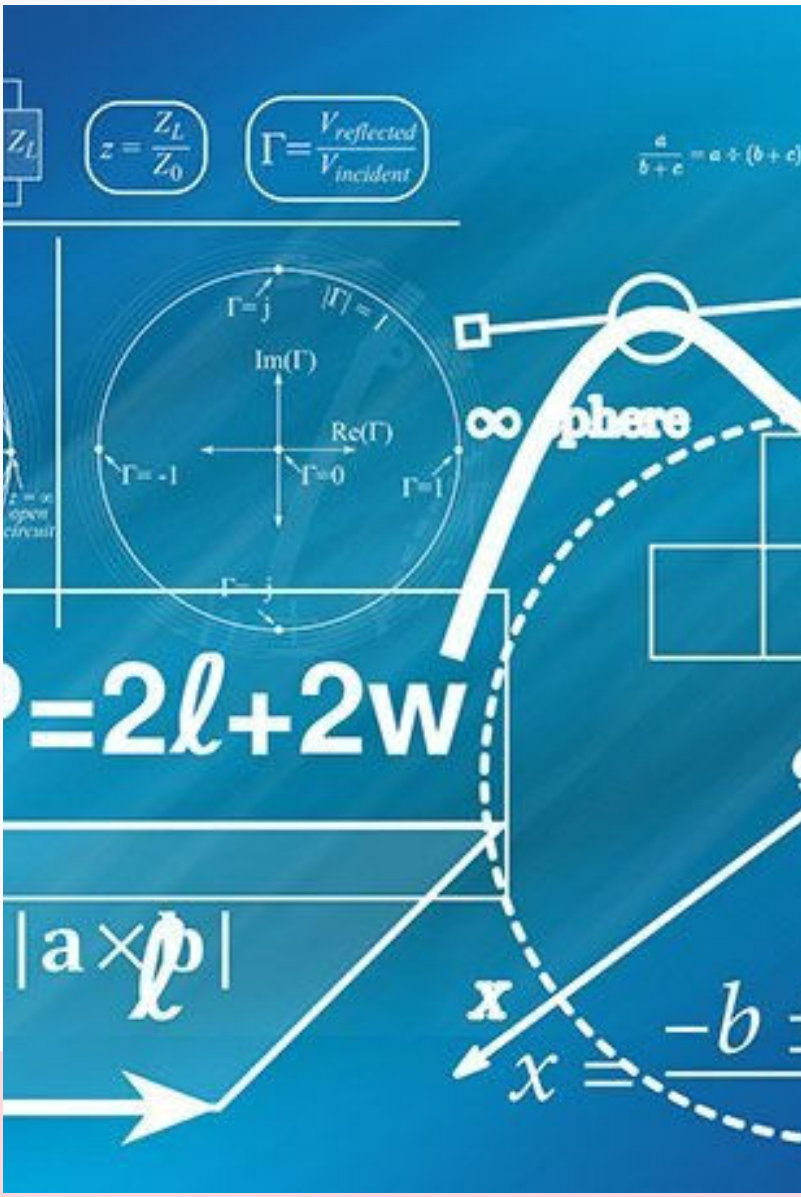
We know Emmy was great mathematician at the same time she was great person and teacher. She was helpful and devoted. Sometimes it would help her students to develop their careers at their own expense by letting them get credit for their ideas.

She went Moscow to see her brother in 1928-1929. But she wasn't stay a lot time there.

Emmy won Ackermann-Teubner Memorial Award in 1932. Howewer, in early 1935, Emmy died unexpectedly four days after an apparently normal post-operative recuperation from the removal of a large ovarian cyst and two smaller benign tumors in her pelvis. She was only 53 years of age and at the peak of her prolific power and genius.

Thanks for everything she did.

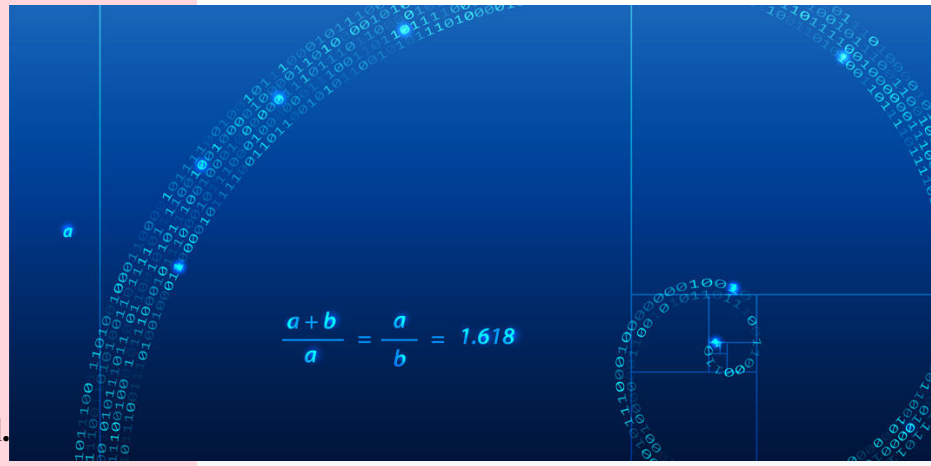
MATHEMATICAL THINKING



Let's start from the beginning. First, math was discovered in Mesopatomian, followed closely by Ancient Egypt. There were lot's of texts about math and the earliest ones were about Pythagoras theory. Greeks growed math. Meanwhile, Romanians created jobs about math. They put math at their usual, daily activities. Also, they used it for improving art too. Math helped a lot. So, why have they called it "math"? In Greek definition of math's "learning", in Hebew, it's "thinking". So, we can think with math and with thinking we can learn about universe more. So, let's talk about mathematical thinking. It makes us wonder more and being curious is the key of everything. Also, it makes us a problem solving person, in life we need that very much. Third, it improves our logical and systematic thinking. With that, our life becomes easier. Don't think that math's just about numbers, it's about thinking, it's about discovering. Let' have a look at some important events of this dreamy subject.

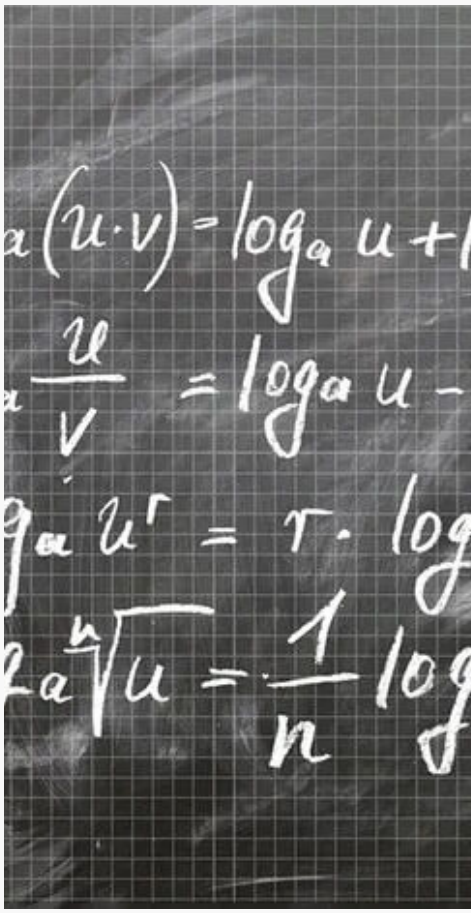
IMPORTANT EVENTS IN THE HISTORY OF MATHEMATICS

1) Pascal's Triangle



Pascal's triangle is a never-ending triangle that follows the rule of adding the two numbers above to get the number below. Its two sides are always one. The triangle goes forever. Pascal's triangle is really useful for algebra, number theory, probability and so many other subjects. The triangle is named after the French mathematician Blaise Pascal.

2) Logarithm



Logarithm was first discovered by Scottish John Napier. He found a relationship between arithmetic sequences and geometric sequences. The arithmetic sequence would be the logarithm of the geometric sequence. With this determination, he introduced the concept of logarithm to the world of mathematics for the first time. Nowadays, we are using logarithm for operations with very large or very small numbers.

3) Fibonacci Sequence

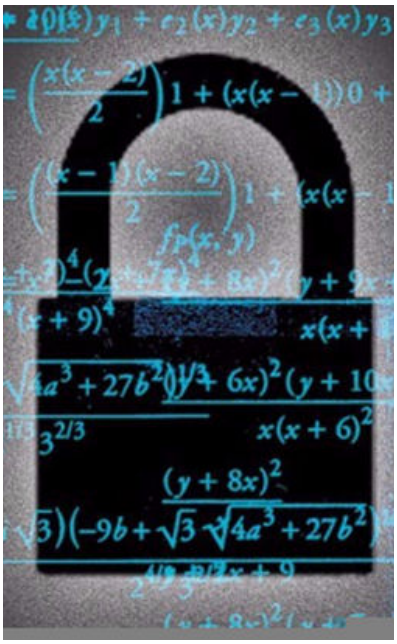
Fibonacci Sequence was discovered by Leonardo Fibonacci. Leonardo Fibonacci is a talented, Italian mathematician. In Fibonacci sequence, each number is the sum of the two preceding numbers. The terms of this sequence are called the Fibo number. There is also a fibonacci sequence in Pascal's Triangle. When the numbers in this series are compared to each other, it is called the golden ratio.

CRYPTOLOGY

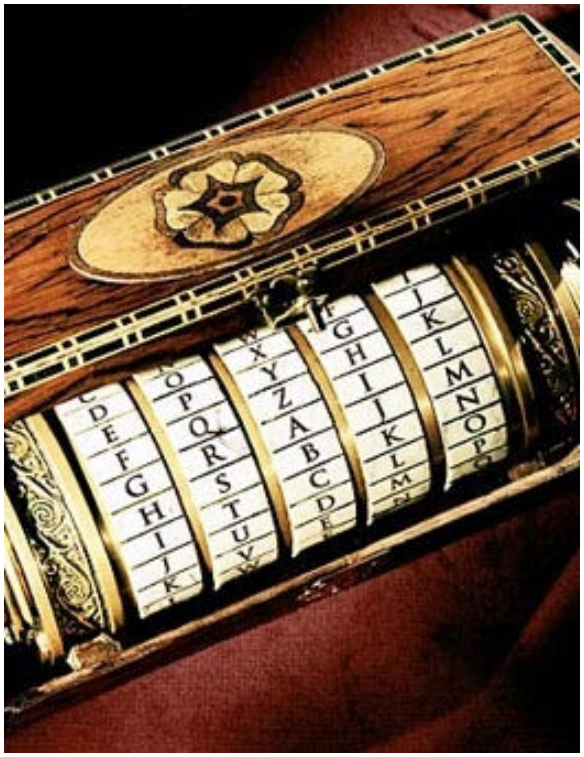
Since the invention of writing, people have attached importance to confidentiality in their communications and have tried to hide the messages they want to convey to the other party with different techniques. Encryption methods have undergone a great change with technological developments.

However, this situation has brought some risks with it. Cyber Security is a new industry area emerging to reduce these risks and make internet use safe. Cyber Security professionals must be trained in areas such as mathematics, computer engineering or software engineering. As a security policy, it is possible to protect information with different methods. As one of these methods, we can talk about cryptology, the branch of science that deals with the protection of information by changing it.

Cryptology is a science of mathematics and is generally based on number theory. Cryptology = Cryptography + Cryptoanalysis



MATHEMATICS AND CRYPTOLOGY



Consider the fact that two people who want to communicate send each other messages via e-mail. These messages pass through many computers.

When it goes from one user to another, we cannot know if it has been opened before, or whether it has been opened before. That's why encryption comes into play. Crypto techniques generally turn this article into an encrypted text with a previously prepared algorithm.

A special algorithm is used to generate the public, private key pair. This algorithm was first developed by three American scientists Rivest, Shamir, Adleman in 1977 and got its name from the initials of these three people, RSA. RSA logically works entirely on prime numbers.

First, a prime number is chosen and this is called the p number. Then one more prime number is chosen, which is called q.

p = 3

q = 11 (3 ve 11 Prime number)

Then one N number, which is the product of these two numbers, is formed.

N = (p * q)

N = (3 * 11)

N = 33

This N number is considered to be modulus. A number a is then formed, and this number a is the product of one minus of p and one minus of q.

a = (p -1) * (q -1)

a = (3 -1) * (11 – 1)

a = 2 * 10

a = 20 number is obtained.

To create the private key, a number of d is generated, and this number must be a number that gives the remainder 1 when the number d is multiplied by the number e and modulated by the number a. The mathematical expression for this is:

d * e = 1 mod a,

d * 7 = 1 mod 20

d = 3 the result is found because

3 * 7 = 21 mod 20 de 1 gives the result.

With this number of d created, the number of N is also private key (d exponent, N modulus)

HYPATİA

She is the first woman to make a significant contribution to the development of mathematics.

She is a Greek philosopher, mathematician and astronomer. She was the daughter of Theon, the famous mathematician of the period. There are no sources about Hypatia's mother. After studying in Athens, Hypatia returns to Alexandria around 400 and begins teaching at the Plato School in the Alexandria Library. Hypatia gave the teachings of Plato and Aristotle to many of her students in this school. Among these students were Orestes, who would later become governor of Alexandria, and Synesius, who would become bishop of Ptolemais. Adhering to the Neo-Platonic doctrine, Hypatia was a member of the Mathematical tradition of the Academy of Athens led by Eudoxus. Hypatia nature; He tried to explain it with logic, mathematics and experiment

Academician Wendy Slatkin writes: Hypatia, on the other hand, lived the life of a respected academic at Alexandria University; a position previously deserved only by men. Deakin points out that he surpassed his esteemed father, as evidenced by previous testimonies of his brilliance. He never married and remained single throughout his life, devoting himself to learning and teaching. Ancient writers agreed that she was a woman of immense intellectual power.

Hyptia is known as the only scientist of her age. He has a 13-volume work in the field of arithmetic. He also discovered the astrolabe, which is mostly used in astronomy to show various problems from measuring the height angles of stars by graphic methods. However, because he was a woman at that time, neither in the history of philosophy nor in the history of science, his name was not mentioned prominently for 1500 years, due to the influence of religion. Unfortunately, he was stoned to death at the age of 45 by a Christian gang for defending his scientific thinking.

THE PLACE OF MATHEMATICS IN OUR LIVES

Mathematics is a phenomenon that manifests itself in almost every aspect of life. When we look at the history of mathematics, it is not difficult to see that mathematics, which has an important place in our daily lives, emerged with the first humans

Mathematics constitutes the infrastructure of nutrition, clothing and shelter in the life of living things. Basically, the need for exchange, the desire to trade leads us to mathematics. For example, in a market exchange, when we buy food and clothing, we use math units of measure, currencies, four-operation skills. Our mothers use weight measurement units while cooking, tailors use length measurement units while sewing, architects make use of angles, geometric shapes and volume while planning our house. The commands given in the study of technological devices are again mathematical commands, mathematics is actually useful in all professions.

Although prejudices try to keep us away from mathematics, it is not possible to remove mathematics from our lives. Mathematics is born with us and is in our genes, even the sequence of our DNA is mathematical. If we give a different example again; For example, you have some money, this amount may be much or less, but if your problem solving is advanced, you will use that money in the best way. Mathematics teaches us how to use the values we have in the most useful way.

INTERESTING INFORMATIONS

In a room of 75 people, there is 99% chance to of them have the same birthday.

You can actually reach to the moon by folding a paper of 0.01mm 45 times.

In East Asian nations, tetraphobia which is the fear of the number four is a common superstition. Because in Japanese, the word ''four'' is spelled very similar to the word ''death''.

A perfect number refers to a positive integer that is equal to the sum of its positive divisors. By this rule, 6 is the smallest perfect number

A baseball field is of the perfect shape of a rhombus..A baseball field is of the perfect shape of a rhombus.

9 is also known as the magic number. This is beacuse if you multiply a number by 9 and add all digits of the new number together, the sum will always add up to 9.

The word "hundred" comes from the old Norse term "hundrath", which actually means 120, not 100.

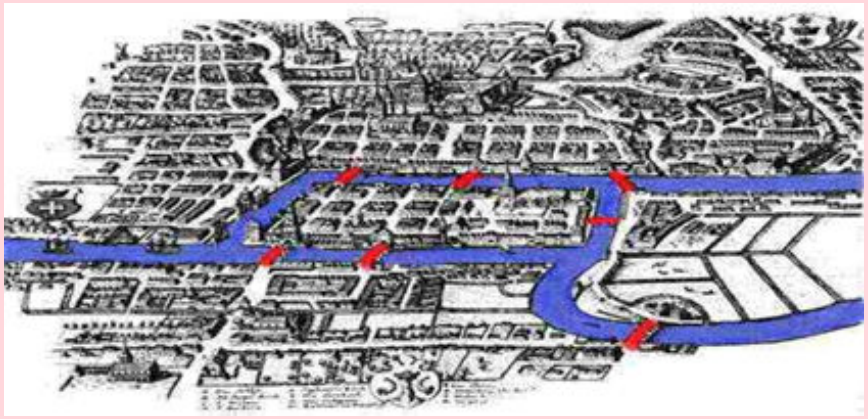
If you shuffle a deck of cards properly, it's more than likely that the exact order of the cards you get has never been seen before in the whole history of the universe.

WERE THE PRIMARY NUMBERS NOT RANDOM?

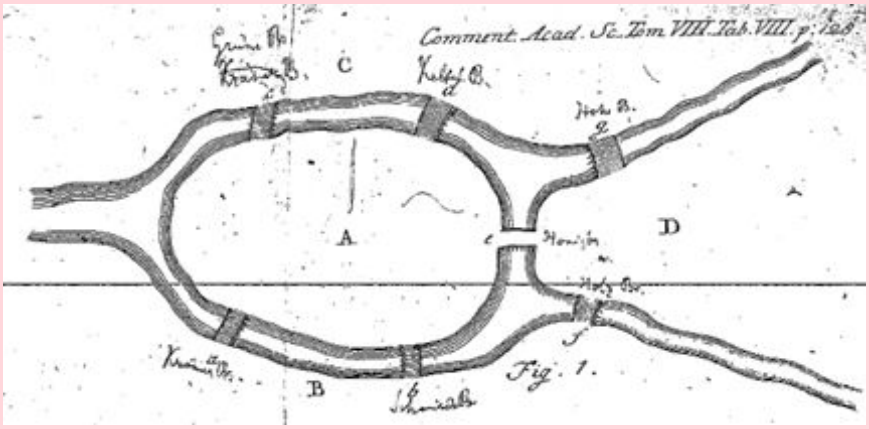
Researchers from Boston University in the USA show that the distribution of prime numbers. They revealed that it was a system. Prime numbers, ``
Numbers that can be divided by one and unlimitedly. The first of these numbers six, 2, 3, 5, 7, 11, 13.If the largest known raft number is four million digit. To date, no one is bound by any rule of prime numbers. could not understand that it was not. The researchers found that successive prime numbers how many digits are between and how the number of numbers changes they examined. The number between the first six prime numbers (2, 3, 7, 11, 13) If the number is the difference between the numbers of digits 1, 2, 2, 4 and 2, respectively, +1, 0, +2, -2 and +2. The number between consecutive prime numbers they saw that the difference in the number was somewhat predictable.
When these differences are ordered consecutively, a positive number is followed by times, According to its additions it sounds the other way around. Just like +2 in the example like the arrival of -22 after.
As a result of a 2-year study using more than 200 thousand computers, 6
The largest prime number with million 320 thousand 430 digits has been determined.
The largest Mersenne prime number with more than 6 million digits on November 17th
An American college student named Michael Shafer in 2003
found. It has been verified that the number is indeed a Mersenne original number. New
With the prime number found, the number of Mersenne primes increased to 40.
The largest prime number is expressed as 2 to the 20.9960.11 - 1.

Graph Theory

The Seven Bridges of Königsberg is a historically notable problem in mathematics. Its negative resolution by Leonhard Euler in 1736 laid the foundations of graph and prefigured the idea of topology



The city of Königsberg in Prussia (now Kaliningrad, Russia) was set on both sides of the Pregel River, and included two large islands—Kneiphof and Lomse—which were connected to each other, or to the two mainland portions of the city, by seven bridges.



The city of Königsberg consists of 4 districts connected to each other by 7 bridges. People of the period thought whether it was possible to cross all these bridges only once. This caught Euler's interest and proved impossible. Euler solved the problem by showing bridges and regions on graphs instead of maps. Euler found that in order to pass over all bridges once, the degrees of each node must be an even number, and explained that the problem can be solved only if 2 nodes have an even number of degrees.

WHERE DOES 'X' COME FROM?

Ömer Hayyam defines the unknown as "THING" in his studies on mathematics, this word passed from Arabic to Turkish. When their work is translated into Spanish, it is written as "XAY", which is unknown. In time, the word XAY is shortened and becomes 'x'. The unknown in mathematics comes from here.

WHO INVENTED NUMBER ZERO?

There is evidence that zero was used in the Maya tribe that lived in Central America around 450 BC. M.S. Around 800 Indians used a symbol similar to zero. Zero emanating from India, M.S. It was adopted and used in Europe around 1400. The word zero probably derives from the Arabic word sifr. Sifr is the translation of the word sunya, which means empty in Hindi.

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