# Hardest math equation in the world

1. Poincaré conjecture French mathematician Henri Poincaré in 1904 posed the problem: Is every simply connected, closed 3-manifold topologically homeomorphic to a 3-dimensional sphere? The solution was provided by Grigori Perelman in 2003 with help from Richard S. Hamilton's program involving Ricci flow. 2. Prime number theorem The question of unraveling the distribution pattern of prime numbers has long been an essential inquiry in number theory. Mathematicians Jacques Hadamard and Charles de la Vallée-Poussin independently presented their proofs in 1896, revealing a remarkable asymptotic distribution pattern. As x values increase, prime numbers become less frequent and gradually thin out. Given article text here The study of prime numbers has garnered significant importance, particularly in cryptography where the properties of primes play a crucial role in securing communications. Andrew Wiles' resolution of Fermat's last theorem is a landmark achievement that has had a profound impact on mathematics. The theorem proposed by Pierre de Fermat states that it is impossible to find three positive integers satisfying the equation an + bn = cn for any integer value n greater than 2. Despite numerous attempts, the solution remained elusive for centuries until Wiles' groundbreaking proof in 1994. His solution was complex and built upon the work of other mathematicians, showcasing the power of advanced mathematical techniques in solving long-standing problems. Similarly, the classification of finite simple groups has been a subject of extensive study. The "enormous theorem" aimed to categorize all finite simple groups, which are fundamental building blocks of group theory. This problem's solution is a collaborative effort by hundreds of mathematicians and spans tens of thousands of pages in hundreds of journal articles published between 1955 and 2004. It has paved the way for a deeper understanding of group theory and its applications in various mathematical fields. The four-color theorem, a groundbreaking mathematical concept proved by computer in 1976, states that any map in a plane can be colored with just four colors such that no two adjacent regions share the same color. This fundamental principle is not about aesthetics but rather the underlying mathematical foundations of map coloring. The solution was achieved through collaborative efforts between mathematicians Kenneth Appel and Wolfgang Haken, but its proof was initially met with skepticism due to its infeasibility for manual verification. To address these concerns, a more accessible proof using similar principles was presented by Robertson et al. in 1997, and later reinforced by Georges Gonthier's use of general-purpose theorem-proving software in 2005. In contrast, Gödel's incompleteness theorems delve into the fundamental limitations of formal systems. Formally, a system is structured and language-defined, comprising symbols, rules, and axioms for representing mathematical expressions. The first incompleteness theorem questions whether true statements exist within these systems that cannot be proven as either true or false. The second theorem further asserts that no consistent formal system can prove its own consistency. These mathematical concepts have far-reaching implications in various fields, including graph theory, computer science, and optimization problems, where applications include scheduling, circuit design, and more. Mathematicians Ponder Simple yet Elusive Problem of Goat Grazing Area Given article text here is a problem in mathematics which has not been solved yet. It involves finding area that a goat can graze while tied to a rope. The problem is simple but mathematicians have tried to solve it for over 100 years. In its basic form, the problem is easy to understand: if you put a rope on ground and tie a goat to it, then the area where the goat can go is semicircle with area $A = 1/2\pi r^2$ where r is length of rope. However, the problem becomes more complicated when the shape of the area changes. For example, if the goat is tied to a square building, the area changes and the goat can also go around corners of the building and create quarter circles. The mathematician Ingo Ullisch recently solved the problem by using complex analysis. His solution was not simple but rather involved intricate calculations and required ratio of contour integral expressions. The fascinating thing about this problem is that it can be used as a mathematical challenge for experts from different fields. It's like a "Rosetta stone" because it helps us understand how mathematics can be applied to various fields. A Collection of Unresolved Mathematical Equations The Collatz Conjecture: This sequence repeats infinitely based on the initial value of n. For instance, if n = 1, the sequence is 1, 4, 2, 1, and so forth. If n = 5, the sequence starts with 5, then follows a loop of 1, 4, 2. The Erdős-Strauss Conjecture: It seeks to prove that any number greater than or equal to 2 can be expressed as the sum of three unit fractions (1/a + 1/b + 1/c). The equation aims to show this possibility for all n ≥ 2. Equation Four Equation: This involves proving whether the expression 2(2^127)-1 - 1 is a prime number or not. A context provided shows that when using lower powers of 2, such as 2^1 or 2^3, and subtracting 1, one gets prime numbers. Goldbach's Conjecture: It states that any even integer can be expressed as the sum of two primes (x + y = n), with n being at least 4. Despite its simplicity, solving this has never been achieved. Equation Six Equation: This equation portrays a relationship between quantum invariants of knots and hyperbolic geometry. It requires familiarity with physics to understand fully. The Whitehead Conjecture: This involves proving that every subcomplex of an aspherical CW complex is also spherical, provided it's connected and two-dimensional. The concept was first mentioned by Whitehead in 1941. Equation Eight Equation: This defines a morphism and its assembly map within reduced C*-algebra concepts. The Euler-Mascheroni Constant Equation: It seeks to determine whether the constant y = lim n→∞ (∑m=1n 1/m - log(n)) is rational or irrational. Despite being calculated up to almost half a trillion digits, it remains unresolved. Equation Ten Equation: This involves finding the sum of π and e (π + e) and determining if it's algebraic or transcendental. Both π and e are known to be transcendental, but their sum has never been solved. Theories Linger, Unsolved for Decades Mathematics has long played a crucial role in shaping life-altering inventions and theories. However, several math equations continue to evade even the greatest minds, including Einstein and Hawkins. Some of these puzzles are based on elementary school concepts yet remain unsolvable. For instance, Lagarias's Elementary Version of the Riemann Hypothesis seeks to prove or disprove the inequality n≥1, with a million-dollar prize offered for its solution. Another equation is the Collatz Conjecture, which involves cycling through a repetitive process starting from 3n+1. The Erdős-Strauss Conjecture Equation, formed in 1948 by Paul Erdős and Ernst Strauss, questions whether one can express 4*n as a sum of three positive unit fractions. The Goldbach's Conjecture Equation, which has been unsolved for centuries, asks to prove that any even number can be expressed as the sum of two primes. Lastly, Equation Six Equation seeks to portray the relationship between quantum invariants of knots and hyperbolic geometry of knot complements. be familiar with physics to grasp the concept. The Whitehead Conjecture Equation: G = (S | R) when CW complex K (S | R) is aspherical if π2 (K (S | R)) = 0, which proves the claim made by Mr. Whitehead in 1941 that every subcomplex of an aspherical CW complex that is connected and in two dimensions is also spherical. The Equation Eight Equation: (EQ4) defines a morphism, referred to as an assembly map, and can be found in the reduced C*-algebra for more insight into this concept. The Euler-Mascheroni Constant Equation: y=limn→∞(∑m=1n1m−log(n)) is used to determine if y is rational or irrational, with y being the Euler-Mascheroni constant and having a value of 0.5772. This equation has been calculated up to almost half of a trillion digits without resolving whether it's a rational number or not. The Equation Ten Equation: π + e finds the sum and determines if it is algebraic or transcendental, with pi and e being transcendental numbers. However, their sum remains unsolved. Looking on the positive side, finding what you're searching for might occur with some luck and a bit of patience, much like trying to forecast earthquakes, where only rough estimates are available. It could take just a few months or even stretch into another century before success is finally achieved.