

D. School 54

Chapter 54 - 7 major math problems in the world

“Tell me what is your next thought?”, Professor Thurston asked, pointing to the answer sheet, looking very excited!

“Well, Professor Thurston, I ...” Although he didn’t give Lu Qiujian a class this semester, he recognized the Fields Prize and the highest award in the geometry circle-the Weiblen Geometry Award Winner.

“Wait a minute!”, As soon as Lu Qiujian said halfway, Professor Nan separated the two of them, and said to Lu Qiujian with a smile, “I think there must be a misunderstanding today!”

Said he took a few pages from the desk and handed it over, “This is the test paper I prepared for you. As for that ... Have you heard of the Millennium Award?”

“What’s that?”, Lu Qiujian took a few glances at the test paper, and finished it within half an hour with his own ability and got full marks without any problem.

“At the Bari International Conference of Mathematicians in 1900, Hilbert delivered a famous lecture called” Mathematical Problems. “He proposed twenty-three based on the achievements and development trends of mathematical research in the past, especially in the nineteenth century. The most important mathematical question. “Instead of answering directly, the male professor talked about the history of mathematics.

“Of the twenty-three questions, questions 1 to 6 are mathematical basic questions; questions 7 to 12 are number theory questions; questions 13 to 18 are algebraic and geometric questions; questions 19 to 23 are mathematical analysis. “, Professor Nan’s tone turned intense.” These problems later became difficult for many mathematicians to try to overcome, which had a profound impact on the research and development of modern mathematics and played a positive role in promoting it. “

“What does that have to do with us now?”, Lu Qiujian looked at Professor Nan somewhat strangely.

“Of course it does! Some of these twenty-three problems have already been solved, just like Professor Wiles solved the Fermat’s theorem! The French mathematician Wei Yi and the Dutch mathematician Van der Walden established the basis of geometric algebra “, Professor Nan paused and continued,” In view of the great impetus brought to the mathematical community by solving

mathematical problems, just a few months ago, the scientific advisory committee of the Clay Mathematics Institute selected seven “millenniums.” “The grand prize problem”, the board of directors of the Clay Mathematics Institute decided to establish a seven million dollar prize fund, and each “millennium grand prize problem” will be rewarded with a million dollars. “

Then he took out the paper that made Lu Qiuqian nearly collapsed. “This is the seven mathematical problems proposed by the Clay Mathematics Institute: NP complete problem, Hodge conjecture, Poincaré conjecture, Riemann hypothesis, Yang · Mills theory, Navier-Stokes equation, BSD conjecture! I just printed it out and discussed with Professor Dyson, which of the seven questions would be the first to be cracked, and put it before leaving. On the desk, I didn’t expect Anna to use it as a test paper for you! “

I will say it! How could this exam be so difficult! Moreover, I have seen several questions in the magazine before. Lu Qiuqian held his forehead depressed and raised his head again after a long time. “What about my exam? Do I need to retake the exam?”

“No, no, don’t use it at all!” Professor Nan waved his hands repeatedly, his index finger tapped on his answer sheet, “I can even take these things you made now to the school to apply for a doctorate for you! Say the exam! I will give you a perfect score! “

“So I can continue playing?” Lu Qiuqian felt better immediately, looking at Professor Nan curiously, “So do you and Professor Dyson think those problems will be cracked first?”

“Professor Dyson thinks the fifth question is the Yang-Mills equation. This equation of Professor Yang Zhenning and Mills not only has a profound impact on the physics world-it can be said that it is not too much to find in the greatest room after the war, And the normative potential is precisely the contact of mathematicians on the fiber bundles that have been studied in depth since the 1930s and 1940s. “Professor Nan first talked about the problems that Professor Dyson thought would be cracked first.” Yang-Mil The prediction of the Si equation has been confirmed in high-energy experiments performed by high-energy physics research institutions such as Brookhaven, Stanford, the European Institute of Particle Physics, and the Tsukuba Laboratory, but has never received a mathematically satisfactory proof. . “

Then he glanced at Thurston, “and I think the Poincaré conjecture of the third problem is the most likely to be solved. Friedman proved the Poincaré conjecture in four dimensions, Thurston The professor introduced the method of geometric structure to cut the three-dimensional manifold. Hamilton used Ricci flow to transform the space, so that mastering the singularity has become the key to solving the Poincaré conjecture! As long as this problem is solved, the Poincaré conjecture can be prove!”

Speaking of Professor Thurston 's contribution, he nodded slightly, and did not take Professor Nan 's praise to heart, intervening through his kung fu, "By now, most of the obstacles to solving Poincaré 's conjecture have been cleared by us. , But I still did n't touch the door that opened the treasure trove, but from this answer sheet, you seem to have found the key! "

Professor Nan glared at him and seemed to be dissatisfied that he was interrupted while he was lyrical. He took a deep breath and said, "In the process of solving this problem, our Chinese mathematicians also made a lot of contributions. Qiu Chengtong 's Student Cao Huaidong has been following Richi flow with Hamilton, and Professor Zhu of Sun Yat-sen University has also made breakthroughs in this area ... but they all just pushed their goals forward one step and your breakthrough ratio They are all big! "

Professor Nan 's long speech actually expressed a meaning. If we compare Poincaré 's conjecture to a dark, cave with no exit, then Professor Thurston in front of him, Hamilton who does not know where, Friedman, even including Cao Huaidong and others, are like the "Hercules Demon" Fan Song, the "Flying God Demon" Zhao He, the "White Ape God Devil" Zhang Chengyun, and the "Golden Monkey God" "Magic" Zhang Chengfeng, etc., used his high internal force to split the rock and head towards the exit, but because of bad luck, he never got through; and this answer by Lu Qiujian was like a sword that Linghu rushed to the ghost, and penetrated The thin rock wall found the direction to get through the cave.

"So can you tell me your thoughts now?" Professor Thurston leaned over and asked, Professor Nan's long list of nonsense wasted too much time, and he can't wait now!

"Okay, I think so about this question!", Lu Qiujian took a sip of black tea from Anna and gave her a throat, and then said.

Well, the time for these seven questions was 2000 in the Craig Institute, but it was parallel to sleep, so the time was delayed by two years.