Singapore Mathematical Society Events and Activities 2018

1. SMS Lecture Series

This annual lecture series, which is traditionally organized in conjunction with the Annual General Meeting of the Singapore Mathematical Society, features eminent local mathematicians or mathematics educators to share with the public some of their interests and ideas.

- Date: 9 Mar 2018
- Venue: NUS LT31
- Title: You don't have to buy Bitcoin. You can mine it. - How to mine cryptocurrencies by solving complex mathematical puzzles
- Speaker: **Dr Kiah Han Mao**

Cryptocurrencies have made headlines in 2017, with one Bitcoin's value rising from 1,400 SGD in Jan 2017 to 17,000 SGD in Jan 2018. Unlike traditional currencies that can only be printed by financial institutions, anyone can produce these cryptocurrencies! One can do so by 'simply' solving complex mathematical puzzles. In this talk, Dr Kiah Han Mao, assistant professor, School of Physical and Mathematical Sciences, NTU, discussed and answered the following three questions:

(a) why solve these puzzles?

(b) what are these puzzles?

(c) why are these puzzles complex?

2. Distinguished Visitor Programme 2018

The Singapore Mathematical Society organises a wide variety of lectures and workshops every year. The talks are delivered by international and local experts in mathematics. The Public Lectures are aimed at a general audience and are suitable for schools students and teachers. The aims are to raise awareness of aspects of mathematics aside from the normal school curriculum, and to promote interest in mathematics among students, teachers, and the general public.

- Date: 24 May 2018
- Venue: NUS LT31
- Title: From Abel to Langlands: the quest for a general reciprocity law and a grand unified theory of mathematics
- Speaker: **Professor Gan Wee Teck**

The 2018 Abel Prize was recently awarded to Robert Langlands of the IAS for "his visionary program connecting number theory and representation theory". In this talk, Professor Gan Wee Teck of NUS gave a non-technical introduction to the historical developments and circle of ideas which led to the Langlands program.

3. Singapore Mathematical Olympiad 2018

- Dates:
  30 May 2018 (Junior and Senior section - First round)
  31 May 2018 (Open section - First round)
  23 June 2018 (Junior and Senior section - Second
  30 June 2018 (Open section - Second round)

- The Society conducted the Singapore Mathematical Olympiad (Junior, Senior and Open Sections) in May/June 2018. A total of 8010 students from 120 schools participated in the various sections of the Olympiad.

- For Junior section, there are 3768 participants from 98 schools. For Senior section, there are 2328 participants from 90 schools. For Open section, there are 1914 participants from 68 schools. In addition, there were 203 participants from Indonesia and Vietnam.

- The SMO Subcommittee 2018 consists of
  - Dr Ku Cheng Yeaw (Chairman/Senior Section Coordinator)
  - Dr Hang Kim Hoo (Deputy Chairman/Administration)
  - Dr Toh Pee Choon (Junior Section Coordinator)
  - Associate Professor Toh Tin Lam (Open Section Coordinator)
  - Associate Professor Tay Tiong Seng (Second Round Coordinator)

- The results of SMO are published in the SMO Problem and Solution book.

3. Singapore Mathematics Projects Festival 2018

- Dates:
  10 February 2018 (Preliminary round A)
  25 February 2018 (Preliminary round B)
  31 March 2018 (Festival Congress – Final round)

- This year the Project Festival attracted 14 projects from Junior section and 28 projects from Senior section.

- The preliminary rounds were held at various locations, including: Hwa Chong Institution, NUS High School of Mathematics and Science, National University of Singapore. Judging panels made up of Mathematicians and school teachers were formed to grade the presentation of each team.

- 5 teams from the Junior section and 5 teams from Senior Section were invited to the Festival Congress held at National University of Singapore, LT33.

- The judges for the Festival were Ku Cheng Yeaw, Tay Tiong Seng, Teo Kok Ming, Toh Pee Choon, Wang Fei, Zhao Dongsheng,

- Medals were awarded to the following projects:

  Junior section
  - Silver: Scrutiny of winners and tournaments, National Junior College
  - Silver: The problem of rooms, NUS High School of Mathematics and Science
  - Bronze: Wefie taking, Nanyang Girls' High School
  - Bronze: The Buffon's needle problem, Hwa Chong Institution
  - Bronze: The poisoned wine problem, Hwa Chong Institution
  - Bronze: Number of self-avoiding walks for an n x m grid, NUS High School of Mathematics and Science
  - Bronze: Monopoly geniuses, Hwa Chong Institution
  - Bronze: Bloxorz, NUS High School of Mathematics and Science
  - Bronze: Analysing Fibonacci sequence by big data technologies, NUS High School of Mathematics and Science
  - Bronze: The sky is not the limit – infinity is, Methodist Girls' School

Senior section

- Gold: Sum of cubes equal to squares of sums, NUS High School of Mathematics and Science
- Gold: A refinement of Young's inequality, NUS High School of Mathematics and Science
- Silver: Ordered randomness, Hwa Chong Institution
- Silver: Ping-pong mathlete, Hwa Chong Institution

- Bronze: Measuring congestion in Mass Rapid System in Singapore, Dunman High School
- Bronze: Getting a billiard ball from point A to B – the math behind playing pool, Catholic High School
- Bronze: Spectrum squares: Clementi Town Secondary School
- Bronze: Marion Walter's theorem, Commonwealth Secondary School
- Bronze: One touch drawing, Hwa Chong Institution
- Bronze: What happens on the Cartesian plane, Nanyang Girls' High School
- Bronze: A new lower bound for Young's cosine series, NUS High School of Mathematics and Science
- Bronze: Optimising a vase, NUS High School of Mathematics and Science

SMPF Partnership Award were awarded to the following schools:

- 15 years: Hwa Chong Institution
- 10 years: Nanyang Girls' High School
- 10 years: NUS High School of Mathematics and Science
- 10 years: Paya Lebar Methodist Girls' School (Secondary)
- 5 years: Clementi Town Secondary School
- 5 years: Methodist Girl's School
- 5 years: Temasek Secondary School

5. Annual Prize Presentation Ceremony

- Date: 01 September 2018
- Venue: NUS High School of Mathematics and Sciences
- Guest of Honour: **Miss Zerlinda Tan**, Country Talent Acquisition Senior Manager, Micron Technology

The following prizes were given out at the ceremony:

- 2 prizes for the Singapore Mathematics Project Festival (Junior Section)
- 4 prizes for the Singapore Mathematics Project Festival (Senior Section)
- 9 prizes for the SMS Essay Competition (3 each in categories A, B and C)
- 30 individual prizes for the Singapore Mathematical Olympiad (Junior section)
- 30 individual prizes for the Singapore Mathematical Olympiad (Senior section)
- 30 individual prizes for the Singapore Mathematical Olympiad (Open section)
- 3 School Awards for the SMPF Partnership Award – 5 years
- 3 School Awards for the SMPF Partnership Award – 10 years
- 1 School Award for the SMPF Partnership Award – 15 years
- 40 School Awards for the Singapore Mathematical Olympiad (Category 1)
- 23 School Awards for the Singapore Mathematical Olympiad (Category 2)
- Awards to the Singapore Team to the 59th International Mathematical Olympiad

6. Workshop for Teachers

- Date: 11 September 2018
- Venue: NUS Math Department, S17-0406

The workshop leaders Dr Hang Kim Hoo and Mr Wang Haibin discussed principles and general guidelines in Math Olympiad programs, and illustrated with examples how to design tasks and infuse problem-solving skills in the teaching of Mathematics at secondary school level. Detailed explanations were given on how to supervise students of various calibres and foundations.

7. Singapore Mathematics Symposium

The Singapore Mathematics Symposium is an initiative by the Singapore Mathematical Society to promote interaction within this community and to showcase some of the exciting developments originating from Singapore. This annual one-day event will include several invited lectures by mathematical scientists from the various institutions and a poster exhibition and competition for graduate students.

- Date: 28 September 2018 (Friday)
- Time: 1.00 pm - 5.45 pm
- Venue: National University of Singapore, LT34 (in Block S17, Mathematics Department building)
- Speakers at the Symposium:

Tan Ser Peow (NUS Math): Hyperbolic jigsaws and families of pseudomodular surfaces.

Kartik Natarajan (SUTD Engineering Systems and Design): On The Interplay of Optimization and Probability in Decision Making

Bernhard Schmidt (NTU SPMS): Bilinear forms on finite abelian groups and Butson matrices

Zhang De Qi (NUS Math): Geometric structures of algebraic manifolds – MMP, Abundance, BAB conjectures

8. Mathematics Teacher Conference 2018

About 900 participants, mostly local mathematics teachers, attended the Mathematics Teachers Conference 2018 which took place on 31st May 2018 at Nanyang Technological University/National Institute of Education (NIE). The event was co-organized by the Mathematics & Mathematics Education Academic Group of NIE and the Association of Mathematics Educators, and supported by SMS. Several SMS members were invited to deliver lectures and workshops for the teachers.

Sharing on Supervising Student Projects during Mathematics Teacher Conference 2018
Mdm Lye Wai Leng from National Junior College has always been supporting SMPF with her supervision of good projects for the SMPF. In 2017, she further coached her young college Mr. Tjhin Ke Ming in supervising the mathematics project. In SMPF 2018, Mr. Tjhin's project won the Silver Medal with Excellent Presentation. The Singapore Mathematical Society invited both Mdm Lye and Mr Tjhin for the "Mathematics Teachers Conference 2018" to share their works on their experience in supervision, so as to share some tips with teachers from other schools. There werre about 20 teachers from varies of schools attending the math project sharing session.

9. SMS Essay Competition 2018

This year, we organized the 8th SMS essay competition with the theme "Mathematics and Cryptology". In the light of the recent cryptocurrency hype, the competition aimed to motivate the students to explore the field of cryptography and discover the Mathematics behind this important application in cyber security. The competition was officially launched on 9 March 2018 during a lecture of the SMS Lecture Series titled "You don't have to buy Bitcoin. You can mine it." by Dr. Kiah Han Mao.

By the closing date of 6 July 2018, we received a total of 48 essay entries from 13 schools with the following breakdown: Category A (secondary 1 & 2 or equivalent): 16, Category B (Secondary 3 & 4 or equivalent): 20, Category C (JC or equivalent): 12.

The judges for the competition were:
Category A: Mr. Kevin Oh Swee Long (MOE) and Mdm. Low Leng (MOE).
Category B: Mr. Christian Ong Go (NUS) and Dr. Tan Weiyu Colin (NUS).
Category C: Prof. Ho Weng Kin (NIE) and Dr. Kiah Han Mao (NTU).

The winning essays are:

Category A

1st: "Application of Cryptology in e-Payment" by Timothy Goy, Jacob Tseng and Luke Tang from Hwa Chong Institution.

2nd: "Cryptography in Our Daily Life and Its Applications" by Shrimay Bikash Saikia from Raffles Institution.

3rd: "The Key to Cryptography" by Tan Wei Liang Darrius, Ng Jing Jie Asher and Calen Tang Wei Herng from Hwa Chong Institution.

Category B

1st: "Cryptocurrency" by Jonas Cham Zhi Xian, Clarance Emmanuel Chua Yong Chen and Ong Yan Deng from Catholic High School.

2nd: "3 Times I was Reminded of Cryptography in the Past Week" by Jen Wei Yao Justin, Soh Yong Xiang and Ng Wei Ming from Hwa Chong Institution.

3rd: "Enigma of the Enigma Machines: Cryptology Methods in the Enigma Machines" by Sean Lim Shao En, Liu Muxin and Heng Tse-Chun from Catholic High School.

Category C

1st: "Evaluation of WhatsApp End-to-end Encryption" by Koh Rei Min Ashley, Lee An Min Amanda and Nikhita Nair from Victoria Junior College.

2nd: "Elliptic Curve Cryptography" by Chua Ming Ru from Victoria Junior College.

3rd: "Feasibility of Breaking the RSA with Integer Factorisation Methods" by Chen Yen, Felix Lim Jing Xiang and Wong Boon Jhee from Victoria Junior College.