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# S.-T. Yau High School Science Award (Mathematics)

by Hongwei Xu and Qing-You Sun

## 2017 S.-T. Yau High School Science Award (Mathematics)

Formerly known as the S.-T. Yau High School Mathematics Awards.

Sponsored by Professor Shing-Tung Yau and Shin Kong Global Venture Capital Corp, the final selection for the S.-T. Yau High School Science Award took place on December 11 and 12, 2017. The awards ceremony was held in Beijing on December 12, 2017.

The S.-T. Yau High School Science Award (Mathematics) (formerly known as the S.-T. Yau High School Mathematics Awards) were established in 2008 to encourage high school students worldwide to participate in project-based competitions in mathematical sciences. 2017 was the tenth year of the program. Following is the list of winners of 2017 S.-T. Yau High School Science Award (Mathematics).

### Gold Awards

*School:* NIS Almaty for Physics and Mathematics

*Members:* Aknazar Kazhymurat

*Adviser:* Dauren Aitmukhamet

*Title:* On a Lower Bound for the Energy Functional for a Certain Family of Lagrangian Tori in  $\mathbb{C}\mathbb{P}^2$

### Silver Awards

*School:* Deerfield Academy

*Members:* Simon Kai Hung Lam

*Adviser:* Xianfeng David Gu

*Title:* Geometric Data Analysis based on Optimal Mass Transportation

### Bronze Awards

*School:* Ningbo Xiaoshi Middle School

*Members:* Zhihe Li

*Adviser:* Cindy Boyd, David Ochoro

*Title:* A family of sequences generated by eliminating some prime factors from the sequence of the naturals

*School:* Shenzhen Middle School

*Members:* Minghao Pan

*Adviser:* Wentao Zhang

*Title:* Quotients of Hurwitz Primes

*School:* Phillips Academy

*Members:* Kaiying Hou

*Adviser:* Jayson Lynch

*Title:* The Hardness of Finding Hamiltonian Cycle in Grids Graphs of Semiregular Tessellations

### Honorable Mention

*School:* The High School Affiliated to Renmin University of China

*Members:* Zhongzi Wang

*Adviser:* Shiu-Yuen Cheng

*Title:* Distributions of points on non-extensible closed curves in  $\mathbb{R}^3$  realizing maximum total energies

*School:* The High School Affiliated to Renmin University of China

*Members:* Bangzheng Li

*Adviser:* N/A

*Title:* Some Studies on Quadratic Diophantine Equations

*School:* The Middle School Affiliated to Peking University

*Members:* Jishi Sun

*Adviser:* Zhichao Shan

*Title:* On Branching Process with a Threshold and its Generalization

*School:* The Affiliated High School of SCNU

*Members:* Wensen Wu

*Adviser:* Jingwei Ge

*Title:* Evans Triangles and Edwards Curves

*School:* The Wellington School, USA

*Members:* Grace M. Tian

*Adviser:* Vishal Patil

*Title:* Linear Upper Bound on the Ribbonlength of Torus Knots and Twist Knots

## 2018 S.-T. Yau High School Science Award (Mathematics)

Formerly known as the S.-T. Yau High School Mathematics Awards.

Sponsored by Professor Shing-Tung Yau and Shin Kong Global Venture Capital Corp, the final selection for the S.-T. Yau High School Science Award took place on December 13 and 14, 2018. The awards ceremony was held in Beijing on December 14, 2018. The S.-T. Yau High School Science Award (Mathematics) (formerly known as the S.-T. Yau High School Mathematics Awards) were established in 2008 to encourage high school students worldwide to participate in project-based competitions in mathematical sciences. 2018 was the eleventh year of the program. Following is the list of winners of 2018 S.-T. Yau High School Science Award (Mathematics).

### Gold Awards

*School:* Deerfield Academy

*Members:* Gerald Jiarong Xu

*Adviser:* Gu Xian Feng

*Title:* Group Theory and Megaminx

### Silver Awards

*School:* Guangzhou No.6 Middle School

*Members:* Yuetong Li

*Adviser:* Bin Qu

*Title:* Equichordal Curves on Simply Connected Surfaces of Constant Curvature

### Bronze Awards

*School:* International Department of Middle School Affiliated to South China Normal University

*Members:* Zhaojun Chen

*Adviser:* Baoguo Hao

*Title:* Pancyclicity and Cycle Length Distribution of Generalized Petersen Graphs

*School:* Phillips Academy Andover

*Members:* Guanpeng (Andy) Xu, Wendy Wu

*Adviser:* Guangyi Yue

*Title:* Second and Higher Gonalities of Erdős-Rényi Random Graphs

*School:* The Second Affiliated Middle School of Beijing Normal University

*Members:* Yibo Hu, Jiahao Guo

*Adviser:* Jiguang Bao

*Title:* On maximum area of the polygons with given side lengths

### Honorable Mention

*School:* Middle School Affiliated to Fudan University

*Members:* Zhouyang Lu

*Adviser:* Dajun Xie

*Title:* On some types of the infinite product

*School:* Shishi Middle School, Chengdu City, Sichuan Province

*Members:* Ruijie Niu

*Adviser:* Weinian Zhang, Wei Li

*Title:* A study on periodic points of tent maps

*School:* Ross Mathematics Program

*Members:* Luchen Shi, Sunay Joshi, Ritwick Bhargava

*Adviser:* Xiudi Tang

*Title:* Congruence of Linear Symplectic Forms by the Symplectic Group

*School:* Middle School Affiliated to Nanjing Normal University

*Members:* Ruixin Qiu, Gouruyue Yuan

*Adviser:* Dun Zhou, Suqiao Zeng

*Title:* A property of integer-valued Lyapunov function for a class of totally nonnegative matrices

*School:* Tsinghua University High School International - Chaoyang

*Members:* Lixin Li

*Adviser:* Qingming Yang

*Title:* Directed graph method for intelligent vehicle to orderly pass through unsignalized intersection and its application

## 2019 S.-T. Yau High School Science Award (Mathematics)

Formerly known as the S.-T. Yau High School Mathematics Awards.

Sponsored by Professor Shing-Tung Yau and Shin Kong Global Venture Capital Corp, the final selection for the S.-T. Yau High School Science Award took place on December 13 and 14, 2019. The awards ceremony was held in Beijing on December 14, 2019. The S.-T. Yau High School Science Award (Mathematics) (formerly known as the S.-T. Yau High School Mathematics Awards) were established in 2008 to encourage high school students worldwide to participate in project-based competitions in mathematical sciences. 2019 was the twelfth year of the program. Following is the list of winners of 2019 S.-T. Yau High School Science Award (Mathematics).

### Gold Awards

*School:* Choate Rosemary Hall  
*Members:* Ziyang Lei  
*Adviser:* Shuliang Bai  
*Title:* Ricci-flat 5-regular graphs

### Silver Awards

*School:* Experimental Middle School Affiliated to Beijing Normal University  
*Members:* Wenhan Zhang, Ziyang Zheng  
*Adviser:* Xiao Sun  
*Title:* A Study on Möbius Function and Euler's Totient of Order  $K$

### Bronze Awards

*School:* Hangzhou Foreign Language School  
*Members:* Shuyang Zhang, Yue Pan, Junyang Chen  
*Adviser:* Ruixiang Ni, Ling Zhu  
*Title:* New Wilker-type Inequalities for Trigonometric Functions

*School:* The Second Affiliated Middle School of East China Normal University

*Members:* Dan Ni

*Adviser:* Zhongyuan Dai

*Title:* Several problems about Function  $f(n) = \Delta(n)/n$

*School:* Pui Ching Middle School, Hong Kong

*Members:* Man Tsung YEUNG, Hanying YAO

*Adviser:* Ho Fung LEE

*Title:* Positioning of Air Pollutant Sources

### Honorable Mention

*School:* International Department of Middle School Affiliated to South China Normal University

*Members:* Zhaojun Chen

*Adviser:* Baoguo Hao

*Title:* Ricci-Flat Graphs with Girth 4

*School:* Fujian Nanping No.1 Middle School

*Members:* Zihang Zheng, Yanxi Liu, Zeng Zhao

*Adviser:* Wentao Bao

*Title:* Research on the fixed-length envelope of the curve

*School:* Shanghai Foreign Language School

*Members:* Li Gu

*Adviser:* Wenjun Chen

*Title:* Analysis of the Heilbronn problem based on the convex body packing density

*School:* Westminster School

*Members:* Michelle Wu

*Adviser:* Steve Miller

*Title:* Biases in First and Second Moments of the Fourier Coefficients in One- and Two-Parameter Families of Elliptic Curves

*School:* The Roxbury Latin School

*Members:* Christopher Zhu

*Adviser:* Pakawut Jiradilok

*Title:* Enumerating Permutations and Rim Hooks Characterized by Double Descent Sets