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笑一笑 Laugh Out Loud

HONG KONG

CAPE OF GOOD HOPE

MOST SOUTH

18°　28°　26

2016 年第五十七屆
國際數學奧林匹克籌備委員會

香港將於 2016 年 7 月主辦第五十七屆國際數學奧林匹克（IMO），迎接來自超過 100 個國家的中學生數學精英。希望《數聞》可在我們邁向 2016 年 IMO 期間帶動同學和公眾對數學的興趣，更希望這種氣氛將會歷久不衰。

歡迎讀者向《數聞》投稿。文章須為原著，以中文或英文寫成（或兩種文本兼備），長度為一至四頁（就一種語言而言），並以電郵附件方式傳送至 info@imohkc.org.hk，或郵寄至 九龍油麻地 405 號 九龍政府合署 4 樓 403 室 教育局數學教育組《數聞》編輯，標題為「Submission to IMOment」。

Hong Kong is proud to be hosting the brightest secondary school mathematics talents from over 100 countries at the 57th International Mathematical Olympiad (IMO) in July 2016. We hope that IMOment will promote interest in mathematics among students and the public in this period leading up to IMO 2016, and beyond.

Readers are welcome to submit articles on mathematics and/or mathematical Olympiad to IMOment. Submissions should be original, one to four pages in length in either Chinese or English (or both), and should be sent by attachment to an email to info@imohkc.org.hk, or be mailed to Rm . 403, 4/F, Kowloon Government Offices, 405 Nathan Road, Kowloon, titled "Submission to IMOment."

Organising Committee of the 57th International Mathematical Olympiad 2016

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IMO2016
www.imo2016.org

IMO 的故事
The Story of IMO

/梁哲雲 LEUNG CHIT-WAN

甚麼是 IMO？

根據國際數學奧林匹克官方網站，**國際數學奧林匹克（IMO）**是全球中學生的數學比賽。第一屆 IMO 於 1959 年在羅馬尼亞舉行，當時只有七個參賽國家。隨着 IMO 的發展，現已有超過 100 個來自五大洲的國家或地區參與此項競賽。

IMO 的宗旨在於：
一 · 提供全球具數學天分的中學生發掘潛能、接受挑戰的機會；
二 · 促進世界各地數學精英的友好關係；
三 · 提供一個各國之間學術交流的平台。

IMO 被公認為最頂尖、最具聲譽的世界性數學競賽。雖然大部分競賽題目並未涉及微積分，但解答試題還需一定程度的數學思維及變通能力。

IMO 代表隊與試題

每個參賽國家或地區會派出一支最多由**六個隊員**所組成的代表隊。所有選手及領隊無須繳交註冊費用。按照一貫做法，主辦國家或地區會負責提供所有隊伍的食宿及為他們籌備文化觀光節目。

IMO 的試題結構精密而嚴謹。雖其覆蓋的範圍大多只包括初等數學（即微積分學前的基本數學部分），但實質上題目極其深奧又具啟發性。另外，試題不局限於普遍中學甚至大學數學課程所教授的內容，內容會涉及諸如函數方程和數論等範疇。IMO 的「難」不在於理解試題，而在於解難時須要運用豐富的數學知識、對數學的洞察力以及靈活分析的技巧。比賽的目的在於培養及表揚學生不斷探索答案並力臻完美的精神。

What is IMO?

As noticeably cited on the **International Mathematical Olympiad (IMO)** official website, the International Mathematical Olympiad (IMO) is the world championship mathematics competition for high school students and is held annually in a different country. The first IMO was held in 1959 in Romania, with 7 countries participating. It has gradually expanded to over 100 countries or territories from 5 continents.

The aims of the IMO are:
1. to discover, encourage and challenge mathematically gifted high school students in all countries;
2. to foster friendly relations between mathematicians of all countries; and
3. to create an opportunity for the exchange of information on school syllabi and practice throughout the world.

The IMO has been widely recognised as the most prestigious and highly-regarded mathematics competition that entails an admirable level of ingenuity in problem-solving, albeit covering mainly pre-calculus subject matters.

IMO team and problems

Each participating country or territory sends a team of **six Contestants**, led by **a Leader** and **a Deputy Leader**, along with some Observers or accompanying persons, if any. There are no registration fees for Contestants, Leaders and Deputy Leaders, and the host country/territory is tasked, as an established practice, with providing meals and accommodation for the whole team, and with arranging social and cultural visits or excursions for them.

The coverage of the competition ranges from pre-calculus problems that are very well structured and extremely difficult but enlightening, to problems on branches of mathematics not generally covered at school or even at university level, such as functional equations and number theory. While the problems are not difficult to understand, their solutions usually require an extensive mathematical knowledge and a resourceful repertoire of insights and manipulative skills. Also, the competition cultivates and celebrates the incentive to find elegant solutions of ingenuity.
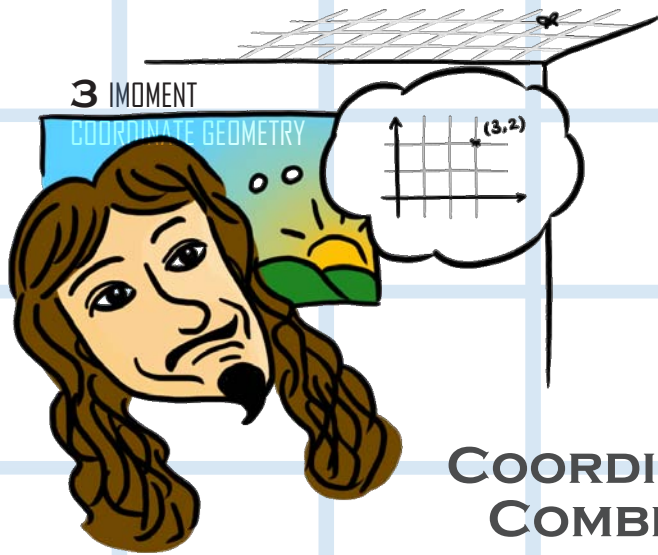
坐標幾何: 數形結合的藝術

Coordinate Geometry: The Art of Combining Numbers and Figures

/盧安迪 ANDY LOO

1619 年夏天的一個早上，剛睡醒的數學家笛卡兒望著天花板上的一隻蒼蠅默默深思。突然，他想到：如果用縱橫雙向的兩個距離，不是剛好能代表蒼蠅的位置嗎？改變整個科學世界的直角坐標系就此誕生。

數字和圖形是數學的兩個主要研究對象，但在坐標系統發展出來之前，數字和圖形一直似是互相獨立的課題。坐標系統讓我們用數字描述圖形的位置，從而把幾何問題轉換成代數問題，把代數問題轉換成幾何問題。

大家或許學過，在三角形 ABC 中，若 D、E、F 分別為三邊BC、CA、AB 的中點，則三條中線 AD、BE、CF 交於一點，即三角形的重心。你又有沒有想過用坐標幾何證明這個命題呢？

設 A、B、C 三個頂點的坐標分別為 (a_1, a_2)、(b_1, b_2) 及 (c_1, c_2)。

由中點公式可知 D、E、F 的坐標分別為

$\left(\dfrac{b_1+c_1}{2}, \dfrac{b_2+c_2}{2}\right)$、$\left(\dfrac{c_1+a_1}{2}, \dfrac{c_2+a_2}{2}\right)$ 及

$\left(\dfrac{a_1+b_1}{2}, \dfrac{a_2+b_2}{2}\right)$。

設 P 為線段 AD 上一點，使得 AP : PD = 2 : 1。根據分點公式，

On a summer morning in 1619, the mathematician René Descartes was lying on his bed and staring at a fly on the ceiling when an idea popped up in his mind: can we not represent the fly's location with its horizontal and vertical positions? This marked the birth of the rectangular coordinate system, a concept that would change the entire scientific world.

Numbers and figures are two of the main subjects that mathematics studies, but they had remained largely independent of each other until the coordinate system was developed. By using numbers to describe the positions of figures, the coordinate system enables us to convert geometric problems into algebraic ones, and algebraic problems into geometric ones.

Some of us have learned that in a triangle ABC, if D, E and F are the midpoints of the sides BC, CA and AB respectively, then the three medians AD, BE and CF meet at a point, the centroid of the triangle. Have you thought of proving this fact using coordinate geometry?

Let the coordinates of the vertices A, B and C be (a_1, a_2), (b_1, b_2) and (c_1, c_2) respectively.

By the midpoint formula, the coordinates of D, E and F are

$\left(\dfrac{b_1+c_1}{2}, \dfrac{b_2+c_2}{2}\right)$, $\left(\dfrac{c_1+a_1}{2}, \dfrac{c_2+a_2}{2}\right)$ and

$\left(\dfrac{a_1+b_1}{2}, \dfrac{a_2+b_2}{2}\right)$ respectively.

Let P be the point on the line segment AD such that AP:PD = 2:1. Then by the section formula,

$$P = \left(\frac{a_1 + 2\left(\dfrac{b_1+c_1}{2}\right)}{3}, \frac{a_2 + 2\left(\dfrac{b_2+c_2}{2}\right)}{3}\right) = \left(\frac{a_1+b_1+c_1}{3}, \frac{a_2+b_2+c_2}{3}\right)$$

同理，若 Q 為線段 BE 上一點，使得 BQ：QE = 2：1，R 為線段CF 上一點，使得 CR：RF = 2：1，則有

Similarly, if Q is the point on the line segment BE such that BQ:QE = 2:1 and R is the point on the line segment CF such that CR:RF = 2:1, then

$$Q = \left(\frac{b_1 + 2\left(\frac{c_1 + a_1}{2}\right)}{3}, \frac{b_2 + 2\left(\frac{c_2 + a_2}{2}\right)}{3} \right) = \left(\frac{b_1 + c_1 + a_1}{3}, \frac{b_2 + c_2 + a_2}{3} \right)$$

以及

and

$$R = \left(\frac{c_1 + 2\left(\frac{a_1 + b_1}{2}\right)}{3}, \frac{c_2 + 2\left(\frac{a_2 + b_2}{2}\right)}{3} \right) = \left(\frac{c_1 + a_1 + b_1}{3}, \frac{c_2 + a_2 + b_2}{3} \right)$$

由此可見，P、Q、R 其實是同一點。我們不但證明了三角形的三條中線交於一點（三角形的重心），更證明了重心到每個頂點的距離是到對邊中點距離的兩倍，以及在直角坐標系中，重心的每個坐標等於三個頂點的相應坐標的平均值！

So, we see that P, Q and R are actually the same point. This proof shows not only that the three medians of a triangle meet at a point (the centroid), but also that the centroid is exactly twice as distant from each vertex as from the midpoint of the opposite side, and that in the rectangular coordinate system, each coordinate of the centroid is the average of the corresponding coordinates of the three vertices!

另外，坐標幾何亦可以幫我們從幾何角度看待代數問題。例如我們要找出以下數式的最小值，其中x、y為實數：

Coordinate geometry can also help us approach algebraic problems from a geometric perspective. Suppose we want to find the minimum value of the following expression, given x and y are real numbers:

$$\sqrt{x^2 + y^2} + \sqrt{x^2 + y^2 - 6x - 8y + 25}$$

這個數式有沒有幾何意義呢？我們注意到，它可以寫成

Is there any geometric meaning in this expression? Note that it can be written as

$$\sqrt{x^2 + y^2} + \sqrt{(x-3)^2 + (y-4)^2}$$

即點 (x,y) 到點 $(0,0)$ 及 $(3,4)$ 的距離之和！點 (x,y) 的最佳位置在哪裏？數式的最小值又是什麼？讀者可以想想這些問題。

which is the sum of the distances from the point (x,y) to the points $(0,0)$ and $(3,4)$! What is/are the optimal position(s) for the point (x,y), and what is the minimum value of the expression? We leave these questions for readers to think about.

坐標幾何在數學奧林匹克中扮演著特別的角色，曾多次拯救港隊隊員，幫他們對付比賽題目。雖然用坐標幾何得出的解答未必是最精簡，但它讓我們通過鍥而不捨的代數計算，解決幾何問題，令不可能變得可能。當你再遇上幾何或代數難題的時候，不要忘記大智若愚的坐標幾何可能是你的最後救星！🛸

Coordinate geometry plays a special role in mathematical Olympiad, and has rescued Hong Kong team members in many contest problems. While coordinate geometry rarely provides the shortest solution to a geometric problem, it often makes the impossible possible by paving a way to success through persistent algebraic calculation. Next time when you get stuck on a geometric or algebraic problem, remember that coordinate geometry may be a last resort. 🛸

國際數學奧林匹

THE IMO HONG KONG

國際數學奧林匹克香港委員會（IMOHKC，以下簡稱委員會）有幸於 1994 年主辦第三十五屆 IMO。委員會在 1986 年由岑嘉評教授領導成立，**岑教授**亦為香港數學學會的創辦人之一。自成立以來，委員會負責選拔具數學潛質的學生，並義務為他們提供培訓課程。委員會的使命為提升本港學習數學的風氣，協助年青人才實現理想，並為香港培育出更多精英，以保持本地競爭優勢。委員會獲香港政府及社會的支持，自 1988 年開始派隊參加 IMO。

由於在成立初期欠缺財政支援，委員會在培訓香港代表隊後所剩的經費不足以資助他們參加 IMO 的旅費。幸而，經岑教授的努力，獲得**本着「普濟勸善」為宗旨的嗇色園**的認同及支持。嗇色園在接下來的幾年亦繼續資助香港代表隊出外參賽的旅費。常言道：「飲水思源」，委員會亦衷心感謝嗇色園一直以來的慷慨捐款及支持。

創業的艱難

在 2012 年，國際數學奧林匹克香港委員會獲得 2016 年第五十七屆 IMO 主辦權。一些立法會議員、學者及社會知名人士亦紛紛加入 2016 年第五十七屆 IMO 籌備委員會（以下簡稱 OC）成為榮譽顧問及委員。這項世界文化盛事預計將吸引約 1000 名來自超過 100 個國家或地區的選手參賽。

委員會為一個慈善組織。為及早準備和進一步推動 2016 年第五十七屆 IMO 及相關的推廣活動，委員會已在 2013 年轉為一間獨立有限公司，名為**國際數學奧林匹克香港委員會有限公司。**並在 **2014 年獲批成為慈善機構。**

國際數學奧林匹克香港委員會有限公司轄下的 OC 現正積極爭取香港科技大學的支持，邀請該校成為 2016 年度 IMO 的主辦大學，為賽事提供場地。

在香港特別行政區政府的支持下，OC 積極與教育局合作，冀能最大限度地發揮 IMO 對本港的正面影響，進一步推動本地學校的數學教育以及提振社會的數理學術風氣。

為了加強以及維持年青人學習數學的動力，學生將由不同媒介接收有關專題學習及參考的資料。而《數聞》亦是其中一個途徑去提升本地學生對學習數學的興趣並鼓勵他們一同參與此項盛事。

2016年
第五十七屆 IMO

HONG KO

克香港委員會

g Committee

In the absence of financial support concerned in the early years of its establishment, the IMOHKC experienced hardships in funding the Hong Kong Team's flight passage for the IMO after training. Thanks to Professor Shum's efforts, the IMOHKC secured the recognition and support of Sik Sik Yuen, which holds the motto "to act benevolently and to teach benevolence". Sik Sik Yuen provided regular funding for the flight passage of the Hong Kong team in the following years. As the saying goes, "be thankful to its source while drinking at a rivulet." The IMOHKC is wholeheartedly grateful to Sik Sik Yuen for its benevolent support throughout.

難時期

The IMO Hong Kong Committee (IMOHKC), founded in 1986 under the auspices of **Professor Shum Kar-ping** who is also a co-founder of the Hong Kong Mathematical Society (HKMS), was privileged to have hosted the 35th IMO 1994 in Hong Kong. Since its inception, the IMOHKC has been undertaking the voluntary work of selecting talented students, providing free yet state-of-the-art training for them, and, with the support of the Hong Kong Goverment and the community, sending teams to take part in IMOs since 1988. The IMOHKC entrusts itself with the task of promoting mathematics education in Hong Kong and values its work as a means, among others, to help actualise the aspirations of the talented students and to contribute to the talent pool of Hong Kong in support of its competitive edge.

Times of Hardship

57th IMO

NG 2016

In 2012, the IMOHKC won the bid to host the 57th IMO 2016 in Hong Kong. Since then, a number of legislators, academics and other social dignitaries have joined the Organising Committee (OC) of the 57th IMO 2016 as Honorary Advisers and Members. This worldwide cultural event is expected to attract around 1200 participants from more than 100 countries/territories.

Since its establishment, the IMOHKC has enjoyed a charity status as a sub-committee of the HKMS. To better prepare for and take forward the 57th IMO 2016 and other associated outreach programmes leading to and beyond 2016, the IMOHKC took the liberty of incorporating itself as an independent limited company in 2013, namely, **The IMOHKC Limited**, and was then granted **the status of a charitable organisation in 2014**. The OC formed under The IMOHKC Limited is currently liaising with the Hong Kong University of Science & Technology as the Host University of IMO 2016 with a view to enlisting its full support and commitment to staging the event in its campus. With the support of the Government of the HKSAR, the OC has been collaborating actively with the Education Bureau (EDB) on tasks which seek to maximize the event in terms of its positive impact on promoting the learning interest in mathematics in the school sector as well as the capacity for appreciating the beauty of mathematics among the general public in Hong Kong.

The IMOment, starting from this issue, is among the various measures to boost students' learning interest in mathematics and promote their involvement in this world-renowned event by introducing to them some theme-based learning and reference materials that are conducive to strengthening and sustaining their learning motivation. 🎓

The 57th IMO 2016

2014年第五十五屆IMO香港代表隊隊員
Hong Kong team member for the 55th IMO 2014

/許百楠 JEFFREY HUI PAK-NAM

一次難忘的IMO

本年國際數學奧林匹克（IMO）在南非開普敦舉行，是歷來首次由非洲國家作為主辦國，所以本年吸引了不少非洲國家首次參與IMO，如布吉納法索、加納，可說是 IMO 的一個突破。

我們於 7 月 5 日深夜出發，乘搭 13 小時飛機到南非最大城市約翰尼斯堡，再乘搭 2 小時內陸機到主辦地開普敦。到達開普敦國際機場後，如去年 IMO 一樣，都會在機場遇到其他國家隊伍。在機場認識當地嚮導 Caylin 後，我們都趕忙在機場將帶來的美金兌換成南非蘭特，以便是次旅程能夠買一些手信或紀念品帶回家。

跟去年不同的是，今年住宿的地方不是酒店，而是被安排住到開普敦大學的大學宿舍。開普敦大學處於桌山之下，景色怡人，亦感受到大學裡的無拘無束。

> 「面對任何難題及自己的弱點時，都不應輕易退縮，只要經過不斷的努力及嘗試，一定能夠成功克服。」" Whatever obstacle or weakness we face, we should not shrink back, for it is only through continuous hard work and tries that we can overcome the challenge. "

在兩天共 9 小時的比賽中，最令我感到慌張的是面對幾何類型題目，因為幾何是我在四大範疇（代數、幾何、組合、數論）之中最弱的一項。尤其當第二天比賽中面對首題時，縱使這題是幾何題，我也要想盡方法，去完成此題。否則，只會白白錯失了 7 分。記得當時，我花了約一小時嘗試用純幾何方法去做，但似乎離證畢尚差一大步。

我懼怕繼續想下去只會徒勞無功，在此刻我決定靠坐標幾何來完成此題。雖然當中會面對極複雜的多項式，需花大量時間去計算及檢查，但我相信若能多花 1 小時來換取 7 分，這是非常值得，所以我小心翼翼地去完成此題。最終化簡一條複雜的 6 次多項式至零後，我不禁鬆一口氣，感到非常大的滿足感。這正正說明面對任何難題及自己的弱點時，都不應輕易退縮，只要經過不斷的努力及嘗試，一定能夠成功克服。

是次南非之旅，我感到十分難忘，不但是因為我首次踏足非洲，能夠見識非洲的文化特色，而且這是我最後一次代表香港參戰 IMO，機會十分難得。藉着這次比賽，更可以認識到來自世界各地的不同選手，不分膚色，不分國界，互相切磋，以數薈友。

在這次旅程，我非常欣賞南非大會的安排，無論是開幕禮及閉幕禮的設計、賽後活動，以及觀光活動，都煥然一新，可看出南非對這次整個比賽及活動流程的重視。在開幕禮及閉幕禮裡，大會安排的表演使整個會場的氣氛非常好，絕無悶場。而在比賽後，大會安排了非洲舞蹈及遊戲的環節，我們在香港很少能夠接觸到這種文化，這是十分難得的學習機會。我們 6 人都樂在其中，至今 "Sho-sho-lo-za" 這句歌詞及與其他隊友一同跳舞的片段還是記憶猶新、歷歷不忘。

An Unforgettable IMO

This year's International Mathematical Olympiad (IMO) was held in Cape Town, South Africa. As the first IMO held on the African continent, this year's event attracted quite a number of new African participating countries, such as Burkina Faso and Ghana. This was a breakthrough in the development of the IMO.

We set off on the night of July 5 and took a 13-hour flight to Johannesburg, South Africa's largest city, followed by a 2-hour domestic flight that brought us to the host city, Cape Town. At the airport, as we did in last year's IMO, we met teams from other countries as well as the local guide Caylin. We hurried to change our US dollars into South African rands, in preparation for souvenir shopping.

Unlike last year, we were arranged to stay this time in the dormitories of the University of Cape Town instead of a hotel. The University offered not only pleasant scenery of the Table Mountain, but also the free ambiance of an academic institution.

In the total of 9 hours of contest over two days, geometric problems troubled me the most as geometry is my weakest area among the four (algebra, geometry, combinatorics and number theory). Although the first problem on the second day was a geometric one, I had to try my best to solve it in order not to lose the 7 points it was worth. One hour of attempt with pure geometry did not get me far.

Fearing that this path would lead me nowhere, I decided to attack the problem using coordinate geometry. The process involved extremely complicated polynomials which took a lot of time to compute and check, but the 7 points were indeed worthy of one more hour of effort. At the end of the meticulous endeavor, I breathed a big sigh of relief and satisfaction when I eventually simplified a cumbersome degree-6 polynomial into zero. Whatever obstacle or weakness we face, we should not shrink back, for it is only through continuous hard work and tries that we can overcome the challenge.

This journey to South Africa was a truly memorable one, not only because it was the first time I stepped on African soil and experienced the exotic culture, but also because it was my last IMO expedition representing Hong Kong. The competition enabled me to get to know contestants from all around the world. Skin color differences and national borders did not prevent us from exchanging and making friends with one another.

I really appreciate the South African organisers' refreshing arrangements of the Opening and Closing Ceremonies, activities and excursions, which reflected how much South Africa valued the event. The performances in the ceremonies created wonderful atmospheres. After the contest, we had the opportunity to learn African dances and games, which provided us with a rare exposure to the African culture. Our joyful dancing memories and the lyrics "Sho-sho-lo-za" have been deeply engraved in our minds.

在觀光方面，我們到了世界聞名的景點 – 好望角，整個大西洋一覽無遺。但美中不足的是，大會並沒有安排我們到大學旁邊的桌山 (Table Mountain) 一遊，因為桌山被獲選為世界新七大自然奇蹟。所以我們香港隊則決定珍惜機會，自費上山遊覽，在山上俯覽整個城市及大海，感受大自然的風光如畫。

We also visited the world-famous Cape of Good Hope, where we could oversee the entire Atlantic Ocean. Regretfully the organisers did not bring us to the Table Mountain next to the University, which was named one of the New7Wonders of Nature. The Hong Kong delegation, however, made our own trip to the Mountain and we were absorbed in the picturesque views of the city and the ocean.

「不分膚色，不分國界，互相切磋，以數薈友。」"Skin color differences and national borders did not prevent us from exchanging and making friends with one another."

This was my second IMO. Not satisfied with my bronze medal last year in Colombia, I was determined to get a silver medal ever since I was chosen as a Hong Kong team member again this year. After training and repeated practice, I finally performed up to my expectations in this contest and won a silver medal with 27 points (out of 42). I was ecstatic to have attained my goal. What was even more gratifying was that the whole team made Hong Kong proud with a satisfactory performance, bringing home 4 silver medals and 2 silver medals and ranking 18th in the world.

這是我第 2 次參加 IMO，去年在哥倫比亞 IMO 取到銅牌，不是十分理想。所以當我今年再次被獲選成為香港代表隊成員後，則下定決心以銀牌或以上為奮鬥目標。在培訓及不斷操練下，最終我在這次比賽中發揮到自己應有的水準，得到 27 分（滿分為 42 分），取得銀牌，達到預期目標，十分開心。而更值得高興的是，此次香港隊 6 位隊員整體表現不俗，共取 4 銀 2 銅，總成績全球排行 18，表現不負眾望，為香港爭光。

Our results would not have been possible without the teachers' tireless instruction and friends' encouragement over the years, which have enriched my knowledge and broadened my horizon, leading to my smooth and fearless performance in the competition. I wholeheartedly thank them, without whom I would not have kept improving in mathematics. I am also indebted to the Leader, Deputy Leader and Observers of the IMO 2014 delegation, who have stood by us throughout the journey.

這次得到理想的成績，全賴過去幾年來導師不辭勞苦的指導以及學長和朋友的鼓勵，豐富我的知識和視野，使我在比賽中能夠不怯不懼、得心應手。沒有他們，我就不會在數學方面一直進步，藉此衷心感謝他們！另外，我也想感謝領隊、副領隊及觀察員，在這次旅程中一路陪伴我們。

In closing, I wish Hong Kong every success in hosting IMO 2016 and in achieving better and better results in future IMOs! :)

最後，預祝 IMO 2016 香港主辦成功，亦希望未來香港隊成績能夠更上一層樓，取得更佳的成績！:)

最新消息 What's New

為您捕捉 GETTING YOU THE LATEST NEWS

第 55 屆 IMO 2014 香港代表隊成績
Result of the Hong Kong Team in the 55th IMO 2014

香港自 1988 年首次派隊參賽以來，每年均於國際數學奧林匹克獲得獎牌，累積獲得 7 面金牌、45 面銀牌及 71 面銅牌。香港代表隊的 6 名成員於 2014 年第五十五屆國際數學奧林匹克中共獲得 4 面銀牌及 2 面銅牌，於 101 個參賽國家及地區中名列第 18 位：

Since its first participation in 1988, the Hong Kong team has been awarded medals in every IMO, obtaining a total of 7 gold medals, 45 silver medals and 71 bronze medals over the years. The Hong Kong team (with 6 members) won 4 silver medals and 2 bronze medals at the 55th IMO 2014, ranking 18th among the 101 participating countries and regions:

	姓名 Name	所屬機構 Organization	獎牌 Medal
領隊 Leader	梁達榮博士 Dr. Leung Tat-wing	國際數學奧林匹克香港委員會 The IMO Hong Kong Committee	
副領隊 Deputy Leader	程德永先生 Mr. Ching Tak-wing		
隊員 Contestants	王慶誠 Wong Hing-shing	喇沙書院 La Salle College	銀牌 Silver
	許百楠 Hui Pak-nam	喇沙書院 La Salle College	銀牌 Silver
	王詩雅 Wong Sze-nga	拔萃女書院 Diocesan Girls' School	銀牌 Silver
	張偉霖 Cheung Wai-lam	伊利沙伯中學 Queen Elizabeth School	銀牌 Silver
	于鎧瑋 Yu Hoi-wai	喇沙書院 La Salle College	銅牌 Bronze
	劉振庭 Lau Chun-ting	拔萃男書院 Diocesan Boys' School	銅牌 Bronze

（第五十五屆及過往歷屆國際數學奧林匹克試題可於 http://www.imo-official.org/problems.aspx 下載。）

(The problems of the 55th IMO and past IMOs can be downloaded from http://www.imo-official.org/problems.aspx .)

香港數學教育活動及資源展 Exhibition of Hong Kong Mathematics Education Activities and Resources

為提升學生的數學興趣及共通能力，數學教育組現正舉辦為期一年的「香港數學教育活動及資源展」。展覽期間會展示多個數學比賽（特別是 IMO 2016）、相關的學與教活動及教學資源的最新資訊。透過這個展覽，數學教育組期望本港學生能在他們的老師和家長協助下具備更多樣化、更全面的數學能力，藉此繼續提升香港學生的整體數學能力。

歡迎學校及家長教師會參觀有關展覽或安排小組參觀活動，有關詳情，請與中心職員聯絡(電話：3698 4437 或電郵：crc@edb.gov.hk)。

To enhance students' interest and generic skills in mathematics, the Mathematics Education Section (MES) is organising the "Exhibition of Hong Kong Mathematics Education Activities and Resources" and the duration of the exhibition is one year. In it, useful and updated information of various mathematical competitions (especially the IMO 2016) and relevant learning and teaching activities/resources are disclosed. Through the exhibition, MES expects students in Hong Kong, with the help of their teachers and parents, to be equipped with more diversified and comprehensive mathematical ability, thereby continuously boosting the overall mathematical standard of Hong Kong students.
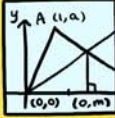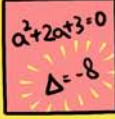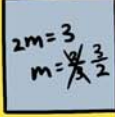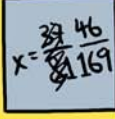
Schools and parent-teacher associations are invited to arrange group visits. For details, please contact the Centre staff (Tel.: 3698 4437 or Email: crc@edb.gov.hk).

笑一笑 Laugh Out Loud

HOW TO SOLVE A MATH OLYMPIAD PROBLEM? (1)

Brought to you by IMO 2016 HONG KONG

1) See a geometry problem.

2) Draw a diagram.

3) No idea.

4) Try ~~brute force~~ co-geom.

5) Get a contradiction.

6) Find an error.

7) Calculate again.

8) Find another error.

9) Get the right proof!

10) Get a 0/7.

11) Argue.

12) Get a 7/7.

(THE END)

挑戰園地 Challenge Corner

1. 本題中，若一個正整數有奇數個不同的正因數，則稱為「怪數」。例如 4 有 3 個不同的正因數（即 1、2、4），所以 4 是怪數；但 10 有 4 個不同的正因數（即 1、2、5、10），所以 10 不是怪數。在 1、2、……、2016 中，共有多少個怪數？

In this problem, a positive integer is said to be strange if it has an odd number of distinct positive divisors. For example, 4 is strange because it has 3 distinct positive divisors, namely 1, 2 and 4, while 10 is not strange because it has 4 distinct positive divisors, namely 1, 2, 5 and 10. How many strange numbers are there among 1, 2, ..., 2016?

2. 已知以下數式代表一個實數，試求它的值。

$$\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\ldots}}}}$$

Given that the expression above represents a real number, find it.

3. 假設在社交網站 Mathbook，每名用戶的朋友數目沒有限制，且朋友關係是相互的（即如果 A 是 B 的朋友，則 B 也是 A 的朋友）。求證必有兩名 Mathbook 用戶的 Mathbook 朋友數目相同。

Assume that on a certain social networking website Mathbook, there is no limit on a user's number of friends, and friendship is mutual (i.e. if A is a friend of B, then B is also a friend of A). Prove that there are two Mathbook users with the same number of Mathbook friends.

4. 設 P 為 ΔABC 的平面內的一點。設 X 為平面內的一點，使得 PX 的中點是 BC 的中點。設 Y 為平面內的一點，使得 PY 的中點是 CA 的中點。設 Z 為平面內的一點，使得 PZ 的中點是 AB 的中點。求證 AX、BY、CZ 交於一點。（提示：試用本期有關坐標幾何的文章中介紹的方法！）

Let P be a point in the plane of ΔABC. Let X be a point in the plane such that the midpoint of PX is the midpoint of BC. Let Y be a point in the plane such that the midpoint of PY is the midpoint of CA. Let Z be a point in the plane such that the midpoint of PZ is the midpoint of AB. Show that AX, BY and CZ meet at a point. (Hint: Try the method introduced in the article on coordinate geometry in this issue!)