

SPEED AND ELEGANCE

There are two objectives in problem-solving: speed and elegance. This means coming up with a solution that is as streamlined as possible – before the rest, preferably.

For most students, mathematics does not equate to fun. Fewer still would relish solving complex maths problems. But Ryan Kor, Lee You Jun and Lawrence Li, all 18, Ang Yan Sheng and Lim Jek, both 17, and Ling Yan Hao, 16, belong to a special group.

Not only are they whizzes at maths, they share hobbies which, some would argue, help develop their mental capacities for doing well in the subject.

Consider that Ryan holds a piano diploma certificate, You Jun and Lawrence have Grade 6 piano certification and Yan Sheng is an erhu player and self-taught pianist. Yan Hao excels at bridge while Lim Jek is an ace at creating complex structures in the computer game Minecraft.

Yan Sheng, who also dabbles in music composition, will tell anyone who would listen that his musical pastime has helped him with maths. He said:

"When I play around with the keyboard to find a nice tune, it's like trying to find different approaches to solving a problem. I believe it indirectly helps the problem-solving process."

MATHS OLYMPIAD

Armed with a competitive spirit and a flair for numbers, this band of mathematical brothers found themselves among the world's best young mathematical minds last month at the 53rd International Mathematical Olympiad (IMO).

More than 600 participants from 200 countries took part in the event in Mar del Plata, Argentina. Some of the countries included the United States, China and Iran. The Singapore team finished in a commendable seventh place but Lim Jek walloped the field as the only competitor to score a perfect score of 42.

Their knack for numbers was discovered early. If enrichment classes and tuition were the norm for their peers, getting perfect scores in their primary school maths exams was not unusual for the lot. As Yan Sheng, a Year 6 student at NUS High puts it: "There has to be at least a few primary school maths exams when that happened."

Schoolmate Lim Jek, too, showed his maths talent early. His father Lim Beng Siang said: "Since Primary 1, he has been scoring full marks for maths. He just found it very easy."



WHAT TIPS DO YOU HAVE FOR ACING MATHS IN SCHOOL?

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Maths Olympians eat, breathe and sleep the subject in the run-up to the event. SHERYL QUEK meets Singapore's best young problem-solvers

Schoolmates Yan Sheng and Yan Hao have similar stories to tell. At 10, Yan Sheng was leafing through A-level maths textbooks, while Yan Hao was swiftly overtaking his older sister in the multiplication tables at five.

MATHS MAGICIANS

From age 11, they were already in the thick of maths competitions, starting with the Singapore Mathematical Olympiad for Primary Schools. Since then, except for some Minecraft and Mozart, they have been thickly cocooned in a maths environment.

No one is complaining though. "I don't remember a time when maths wasn't fun," said Ryan, who like You Jun and Lawrence, is in Year 6 at Raffles Institution (the equivalent of JC2).

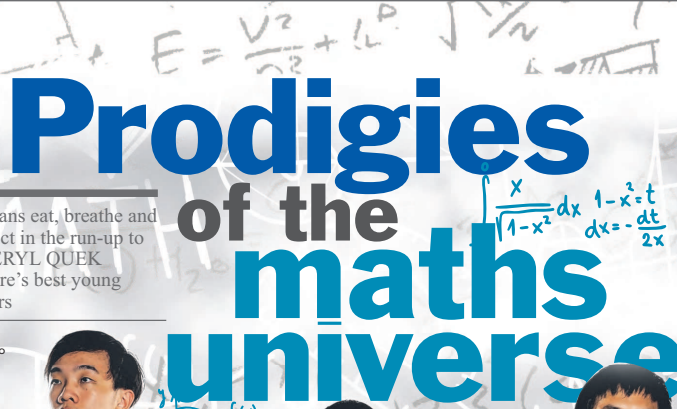
All have honed their skills during maths immersion trips organised by their schools. Pitting themselves against students from Hong Kong, Taiwan and China keeps them sharp. "They're tough," said Lawrence of the questions set by the Chinese.

On their own, they tinker with some problems every day. During lunch, on the train, waiting for the bus, the cogs are cranking, figuring out some complex problem.

"I get a great sense of achievement when I solve the kind of maths problems I'm not expected to be able to solve. You feel good when you look at the solution," said You Jun, voicing what the others felt.

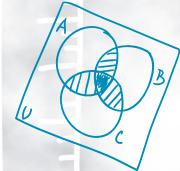
Among themselves or members of the IMO national training team, they swap solutions and new problems. On Facebook, they pick the brains of those they befriended at overseas Olympiads. The also trawl Art of Problem Solving, an online forum where top minds in Olympiad maths worldwide gather.

Rivalry keeps them on their toes. To get selected for the national training team, they first have to ace the Singapore Mathematical Olympiad, which sees about 10,000 students competing every year. The training team, comprising about 20 members, are then subjected to another round of selection tests, before the best six



UGLY QUESTIONS

Unoriginal questions are largely deemed as ugly. Repeated questions or those with predictable solutions during practice are generally despised. Said Ling Yan Hao, 16: "Sometimes, when you read the question, you may not even feel like getting started."



MENTAL STAMINA

The IMO is a gruelling experience. "Preparing for it is like preparing for a marathon. You need a lot of training," said Yan Sheng.

Mental stamina is key. The competition comprises six questions, spread out over nine hours in two days. The second is known to be the toughest and question six – a convoluted problem – is the toughest nut to crack.

Training for the IMO national training team began last September with weekly three-hour maths practice sessions on Saturdays at the National University of Singapore. This culminated in an intensive two-week training camp in June, which was essentially a maths camp with meals in between.

Dr Wong Yan Loi, who has been leading the team since 2008 to the maths meets said: "Both talent and hard work are necessary to get results at the IMO. I was told a survey in China revealed that a gold medalist not only possesses natural talent in mathematics but also has to train hard by himself or herself for about 10,000 hours over a period of 10 years."

But whiz-kids get tired too. "After the paper, you don't feel like thinking for a while," said Lim Jek, who has participated in the IMO every year since 2009. And that is where their hobbies come in: playing the piano, solving jigsaw puzzles, playing games such as chess and bridge and computer games such as Minecraft.

For now, it is back to school for the six. And like it or not, that also means dealing with school maths, which they described as "disgusting" and a bore. "To me, it is a mechanical exercise," bemoaned Yan Hao.

While the drudgery will cease for four who are graduating this year, Yan Hao and Lim Jek will have to soldier on – until the next Olympiad.

UGLY MATHS

To the maths Olympians, there is such a thing as ugly maths. For them, it is the maths you do in school. Said Ang Yan Sheng, 17: "School maths is like this: Here's a technique to use, now use it brainlessly to solve a bunch of problems."



MORE THAN MATHS

Members of this year's Maths Olympiad team are regulars in non-maths Olympiads or their equivalent, too, such as the Singapore Physics Olympiad. Lim Jek, 17, has also competed in the Singapore National Olympiad in Informatics, while Yan Sheng has taken part in the Intel International Science and Engineering Fair.



Lee You Jun (clockwise from left), Ang Yan Sheng, Ling Yan Hao and Lawrence Li represented Singapore in this year's International Mathematical Olympiad.