K5| Lesson Design & Delivery

with Dr. Yeap Ban Har

Upcoming Events
https://3rteachertraining.com/calendar

About Ban Har

The media has called Dr. Yeap Ban Har "Singapore Math's Michael Jordan" and "Royalty when it comes to Singapore Math." He is considered to be one of the most accomplished trainers and speakers in the world on the subjects of K12 Mathematics, and the Singapore approach to teaching mathematics.

Dr. Yeap Ban Har taught at National Institute of Education, Nanyang Technological University in Singapore for more than ten years. There he taught a range of teacher education courses and was involved in several funded research programmes in mathematics education.

For the last eight years, he has held two concurrent positions as the Director of Curriculum and Professional Development at the Pathlight School in Singapore, and the principal of Marshall Cavendish Institute, a global teacher professional development division of Marshall Cavendish Publishers. He has since left his position at Marshall Cavendish Institute to take up a more active role at the Anglo Singapore International School, a Singapore school with three campuses in Thailand.

He has authored dozens of textbooks, various titles in mathematics education and scholarly articles. His latest project is the new program, "think! Mathematics" by Shing Lee Publishers, an exciting new elementary Singapore Mathematics program co-authored with the owners of 3R Industries, Drs. Amy and Bill Tozzo.

To Learn More About think! Mathematics

3RTeacherTraining.com/think-mathematics
Downloadable samples, digital access, desk-copy requests, FAQ's and up to date release information.
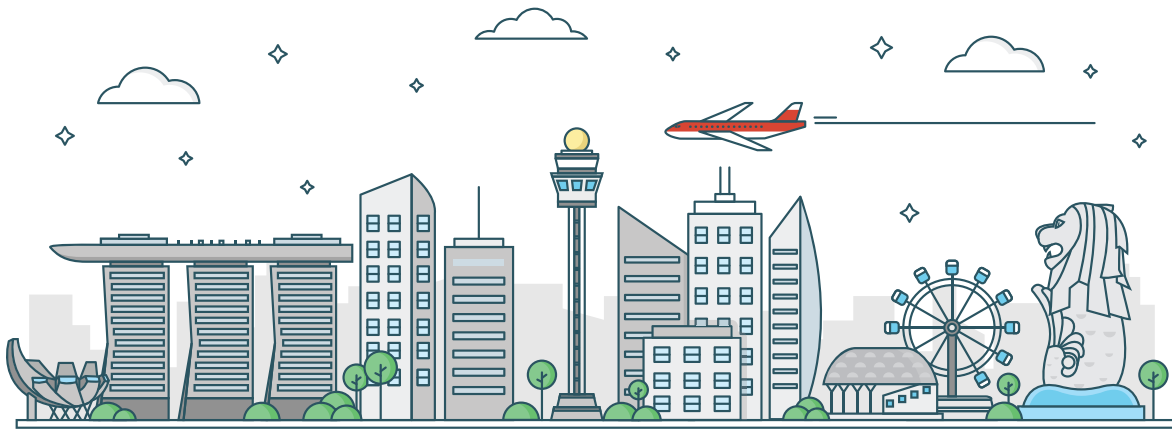
Introduction – Background and History of Singapore Mathematics

Until the 1980's, Singapore students performed poorly in mathematics.

	1970s	1980s	1990s	2000s
500s	Japan	Hong Kong, Japan & Korea	Hong Kong, Japan, Korea & Singapore	Hong Kong, Japan, Korea & Singapore
400s	Thailand	Philippines, Singapore & Thailand	Malaysia & Thailand	Malaysia & Thailand
300s			Indonesia & Philippines	Indonesia & Philippines

Source: Hanushek, Jamison, Jamison & Woessmann, 2008

Back then, rote memorization, rote procedures and tedious computations were the bane of mathematics learning in Singapore and the rest of Southeast Asia. The low performance was the impetus for a reform in mathematics teaching and learning in Singapore.

In the 1980's, what is now called Singapore Mathematics was researched by the Curriculum Development Institute of Singapore (CDIS) and introduced to Singapore schools. It was formally introduced to the system in 1992 and has since been revised in 2001, 2007 and 2013.

The Singapore system has come a long way. In the most recent TIMSS (Trends in International Mathematics and Science Study), an international benchmarking study, the proportion of Grade 4 and Grade 8 students in the so-called Advanced International Benchmark was way above the international average.

Selected results for TIMSS 2015 are as shown.

GRADE 4	MEAN	ADVANCED	HIGH	INTERMEDIATE	LOW
Singapore	618	50	80	93	99
England	546	17	49	80	95
Finland	539	8	43	82	97
USA	535	14	47	79	95
Indonesia	397	0	3	20	50

Source: Mullis, Martin, Foy & Arora, 2016

GRADE 8	MEAN	ADVANCED	HIGH	INTERMEDIATE	LOW
Singapore	621	54	81	94	99
England	518	10	37	70	91
USA	518	10	36	69	93
Malaysia	465	3	18	45	76
Thailand	431	3	10	29	62

Source: Mullis, Martin, Foy & Arora, 2016

In TIMSS 2015, the median score of Singapore students in Grade 8 was 621. The 10th percentile score was 505 (international median was 500) and the 90th percentile score was 715.

GRADE 8	MEAN	10TH	90TH
Singapore	621	505	715
Malaysia	465	353	580
Thailand	431	322	549

Source: Mullis, Martin, Foy & Arora, 2016

GRADE 8	MEAN	10TH	90TH
Singapore	621	505	715
Taiwan	599	459	714
Hong Kong	594	489	686
Japan	586	470	699
Korea	606	491	711

Source: Mullis, Martin, Foy & Arora, 2016

GRADE 8	MEAN	10TH	90TH
Singapore	621	505	715
Australia	505	397	610
Canada	527	352	557
England	518	414	624
Ireland	523	426	612
New Zealand	493	378	605
USA	518	408	624

Source: Mullis, Martin, Foy & Arora, 2016

Selected results for PISA 2015 are as shown.

	BELOW LEVEL 1 (< 360)	LEVEL 1 (< 420)	LEVEL 5 (> 600)	LEVEL 6 (> 660)
Indonesia	38	31	0.6	0.1
Malaysia	14	24	2	0.2
Singapore	2	6	22	13
Thailand	24	30	1	0.2
Vietnam	5	15	7	2
EU	8	14	9	2

Source: OECD, 2016

	BELOW LEVEL 1 (< 360)	LEVEL 1 (< 420)	LEVEL 5 (> 600)	LEVEL 6 (> 660)
China	6	10	17	9
Hong Kong	3	6	19	8
Macau	1	5	17	5
Taiwan	4	8	18	10
Korea	3	8	15	5
Japan	5	10	14	7
EU	8	14	9	2
Singapore	2	6	22	13

Source: OECD, 2016

	BELOW LEVEL 1 (< 360)	LEVEL 1 (< 420)	LEVEL 5 (> 600)	LEVEL 6 (> 660)
Denmark	3	11	10	2
Finland	4	10	10	2
Norway	5	12	9	2
Sweden	7	14	8	2
EU	8	14	9	2
Singapore	2	6	22	13

Source: OECD, 2016

	BELOW LEVEL 1 (< 360)	LEVEL 1 (< 420)	LEVEL 5 (> 600)	LEVEL 6 (> 660)
Portugal	9	15	9	3
Spain	7	15	6	1
Argentina	27	29	0.7	0.1
Buenos Aires	14	20	4	0.5
Brazil	44	27	0.8	0.1
Chile	23	26	1	0.1
Colombia	35	31	0.3	0
Costa Rica	27	35	0.3	0
Dominican R	68	22	0	0
Mexico	26	31	0.3	0
Peru	38	28	0.4	0
EU	8	14	9	2
Singapore	2	6	22	13

Source: OECD, 2016

Lesson Design is Science

Lesson Delivery is Art

Through a series of case studies of lesson segments, we will unearth a series of design principles for lessons that promote deep learning and a positive mindset about mathematics and learning.

We would like to encourage you to document for yourself aspects of **lesson delivery** that you experience during the day which you feel can contribute to deep learning and a safe learning environment that is both supportive and challenging.

What type of **questions** do teachers use in the math classroom and what are their purpose? You will hear various questions that can be categorised into a few categories, each playing a different role in the learning process.

We will discuss the three parts of a lesson which embeds five features, the five experiences students need to have, the two models of differentiation with several accompanying strategies, the four skills to focus on in an intervention program, and, of course, the CPA Approach. However, the day's experience should give us further **insights** into each of these that no amount of lecture can provide us with.

Ask questions. Share your observations.

That's when the best answers to your mathematics pedagogical questions surface.

Case Study 1

Spiky had 14 doughnuts.

He gave his friend 8 doughnuts.

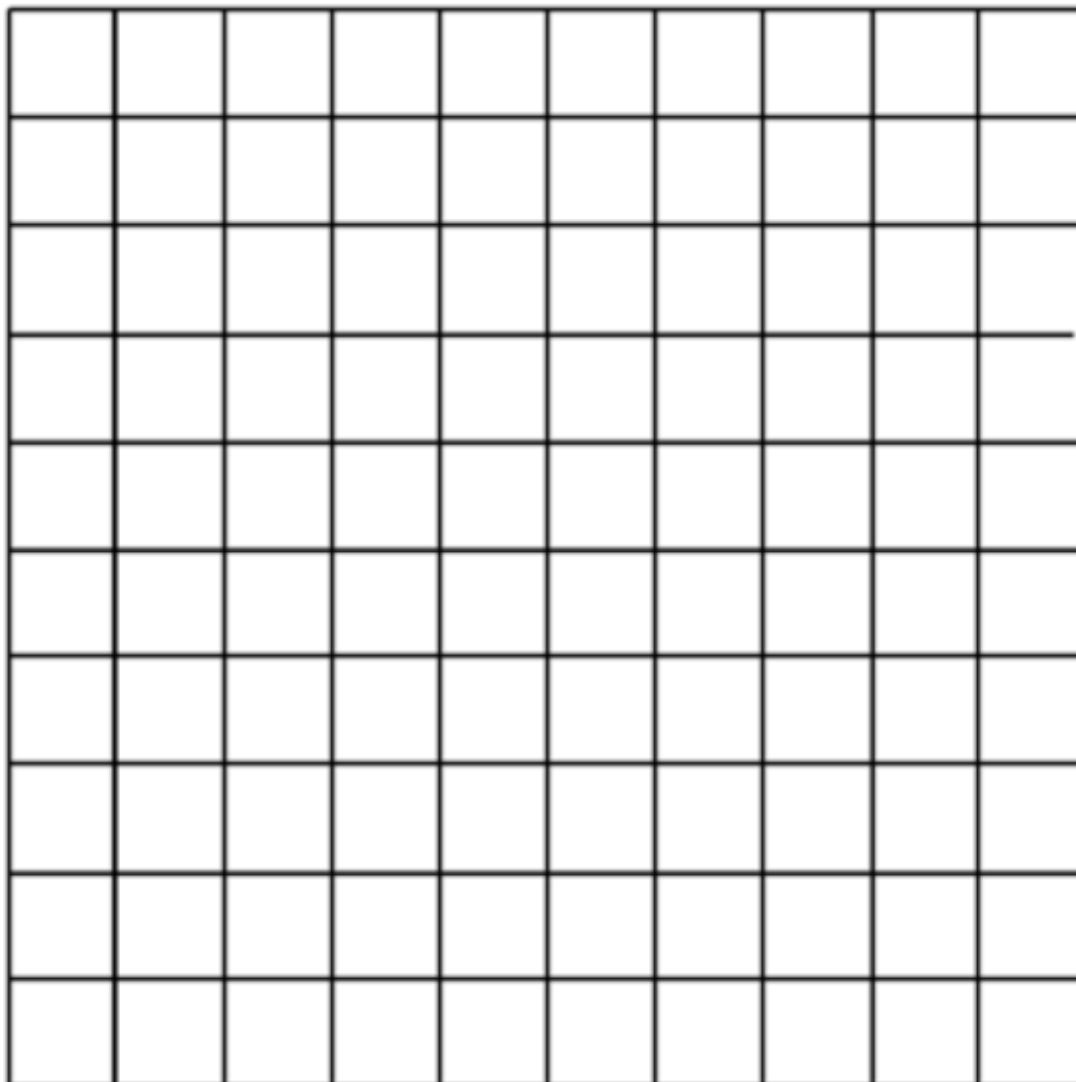How many doughnuts does Spiky have left?

Case Study 2

Collect five square tiles.

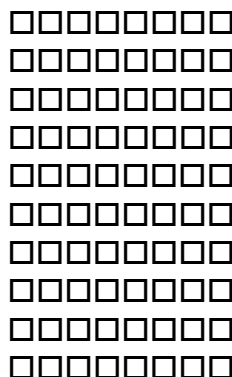Make different shapes using the five tiles.

Make different shapes using the five square tiles according to Spiky's rules.

Case Study 3

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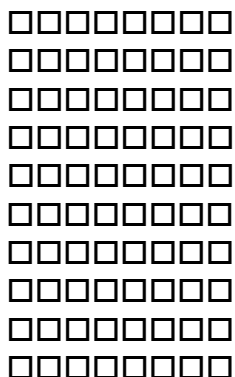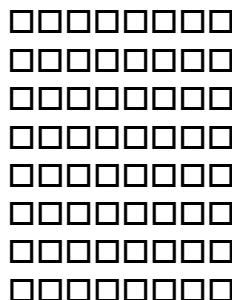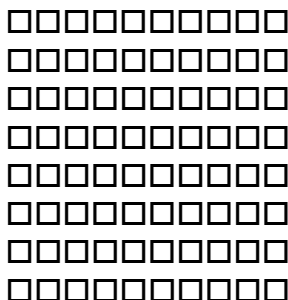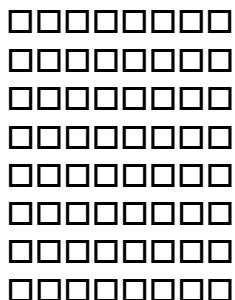□□□□□□□□   □□□□□□□□□□   □□□□□□□□
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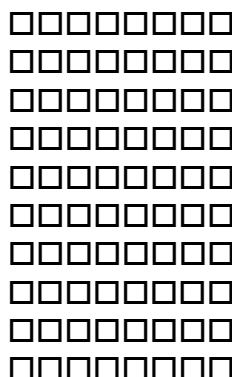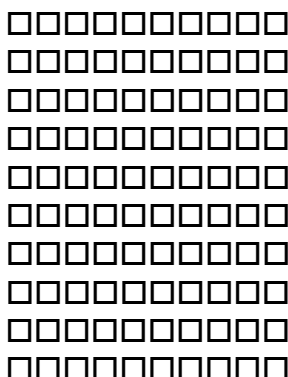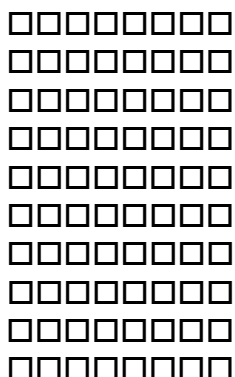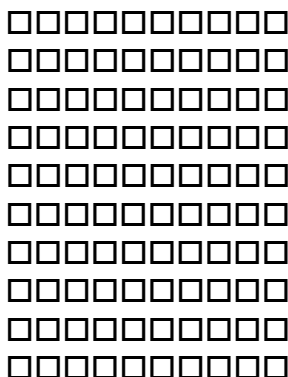
How many seats are there in this theatre?

Case Study 4

Spiky arranges three fractions in order, from the smallest to the greatest.

$$\frac{2}{3} \qquad \frac{3}{4} \qquad \frac{5}{6}$$

Is he correct?

Case Study 5

Spiky used $\frac{3}{4}$ of his building blocks, Curly used $\frac{2}{3}$ of hers, and Smiley used $\frac{1}{3}$ of his. Each person used the same number of building blocks. Together, they used 1050 building blocks.

What questions can be answered?

Notes

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