World-Class Singapore Math for Your Classrooms

Program Overview
Middle School
Why Singapore Math?

The reason is simple. Singapore students consistently demonstrate exceptional math achievement on international studies. U.S. students now have the opportunity to benefit from the same approach with *Math in Focus™: Singapore Math by Marshall Cavendish*, the U.S. edition of Singapore’s K–8 curriculums.

Singapore’s exceptional results:

Since the Trends in International Math and Science Study (TIMSS) began in 1995, Singapore has consistently ranked at the top. The table displayed here shows the top 15 countries from the most recent report, with Singapore outperforming the United States by 85 points.

**Trends in International Math and Science Study (TIMSS)**

Since the Trends in International Math and Science Study (TIMSS) began in 1995, Singapore has consistently ranked at the top. The table displayed here shows the top 15 countries from the most recent report, with Singapore outperforming the United States by 85 points.

**TIMSS® Grade 8**

<table>
<thead>
<tr>
<th>Country</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese Taipei</td>
<td>598</td>
</tr>
<tr>
<td>Korea</td>
<td>597</td>
</tr>
<tr>
<td>Singapore</td>
<td>593</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>572</td>
</tr>
<tr>
<td>Japan</td>
<td>570</td>
</tr>
<tr>
<td>Hungary</td>
<td>517</td>
</tr>
<tr>
<td>England</td>
<td>513</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>512</td>
</tr>
</tbody>
</table>

**United States** | 508

**PISA Mathematics Scale**

1. Shanghai-China 600
2. Singapore 562
3. Hong Kong-China 555
4. Korea 546
5. Chinese Taipei 543
6. Finland 541
7. Liechtenstein 536
8. Switzerland 534
9. Japan 529
10. Canada 527
11. Netherlands 526
12. Macao-China 525
13. New Zealand 519
14. Belgium 515
15. Australia 514
16. Germany 513
17. Estonia 512
18. Iceland 507
19. Denmark 503
20. Slovenia 501
21. Norway 498
22. France 497
23. Slovak Republic 497
24. Austria 496
25. Poland 495
26. Sweden 494
27. Czech Republic 493
28. United Kingdom 492
29. Hungary 490
30. Luxembourg 489
31. United States 487

OECD Programme for International Student Assessment (PISA)

Singapore participated in the PISA study, which assesses 15-year-olds in industrialized countries. Singapore was a top-performing nation in math, and while Singapore students scored significantly above the international average, the United States scored below the average, ranking #31 out of 66.

To learn more, visit [hmheducation.com/singaporemath](http://hmheducation.com/singaporemath) or call 800.289.4490.
A results-driven framework for student achievement

Build confidence in **problem solving**

*Math in Focus* is based on the framework developed by the Singapore Ministry of Education. It draws on best practices from around the world and highlights problem solving as the focus of mathematical learning.

A key differentiator for Singapore math is its focus on attitudes and metacognition. In order for students to excel, they must develop positive attitudes about math, have the confidence to persevere, and develop the ability to monitor their own thinking. This sets the stage for international achievement.

**Singapore Mathematics Framework**

- **Mathematical Problem Solving**
  - Numerical calculation
  - Algebraic manipulation
  - Spatial visualization
  - Data analysis
  - Measurement
  - Use of mathematical tools
  - Estimation

- **Concepts**
  - Numerical
  - Algebraic
  - Geometrical

- **Skills**
  - Statistical
  - Probabilistic
  - Analytical

- **Processes**
  - Monitoring of one’s own thinking
  - Self-regulation of learning

- **Metacognition**
  - Beliefs
  - Interest
  - Appreciation
  - Confidence
  - Perseverance

**Build understanding with visual learning**

The key to becoming a successful problem solver is the ability to visualize mathematical situations. *Math in Focus* teaches concepts with consistent and effective visuals that lead to deeper understanding of symbolic representations.

Students build understanding of new concepts through visualization and pictorial representations like number lines and bar models.

For example, consider the addition of two negative integers:

\[-2 + (-4) = -6\]

Using a number line to model the sum, start at -2 and move 4 units to the left, then 2 units further left.

Example from Course 2, Student Book A, page 61

Example 1 Adding two negative integers.

Use absolute values to find the sum of two negative integers.

**Method 1**

Evaluate \(-2 + (-4) = -6\).

Start at 2, adding 4 units to reach 6, a jump of 4 to the left to reach -2.

**Method 2**

Starting at -2, first find the distance of the sum from 0. Then decide if the sum is positive or negative.

2 Write the absolute value of each integer.

Add the absolute values.

6 Simplify.

Use the common sign, a negative sign, for the sum.
Math in Focus is your answer to the Common Core

A model for the Common Core State Standards

The Common Core State Standards committee looked to high-performing nations like Singapore as a model for the new U.S. standards. The Common Core calls for a new level of rigor, depth, and coherence that will allow our students to compete globally on mathematics assessments and in their future careers. Math in Focus: Singapore Math by Marshall Cavendish is your answer to achieving these goals.

According to Achieve, an independent, nonprofit educational foundation:

“Overall, the Common Core State Standards (CCSS) are well aligned to Singapore’s Mathematics Syllabus. Policymakers can be assured that in adopting the CCSS, they will be setting learning expectations for students that are similar to those set by Singapore in terms of rigor, coherence and focus.

—Achieve* (achieve.org/CCSSandSingapore)"

Math in Focus supports the big ideas in the Common Core:

1. **Teach less, but learn more**
   Through multi-day lessons and minimal repetition from year to year, Math in Focus students learn concepts in depth to mastery.

2. **Balance conceptual understanding and procedural fluency**
   An emphasis on visual learning ensures that students understand how procedures work and can apply them in problem-solving situations.

3. **Focus on ratio, geometry, number, statistics, and expressions**
   Math in Focus aligns to the Common Core Domains to prepare students for algebra and higher-level mathematics.
Math in Focus is your complete K–8 solution

Robust print and technology resources provide everything you need to support mastery of the Common Core State Standards.

Math in Focus includes comprehensive print and digital resources for:

✓ Easy Planning
✓ Transition
✓ Instruction and Practice
✓ Differentiated Instruction, including RtI and Enrichment
✓ Assessment
### Table of Contents

#### COURSE 1
- Chapter 1: Positive Numbers and the Number Line
- Chapter 2: Negative Numbers and the Number Line
- Chapter 3: Multiplying and Dividing Fractions and Decimals
- Chapter 4: Ratio
- Chapter 5: Rates
- Chapter 6: Percent
- Chapter 7: Algebraic Expressions
- Chapter 8: Equations and Inequalities
- Chapter 9: The Coordinate Plane
- Chapter 10: Area of Polygons
- Chapter 11: Circumference and Area of a Circle
- Chapter 12: Surface Area and Volume of Solids
- Chapter 13: Introduction to Statistics
- Chapter 14: Measures of Central Tendency

#### COURSE 2
- Chapter 1: The Real Number System
- Chapter 2: Rational Number Operations
- Chapter 3: Algebraic Expressions
- Chapter 4: Algebraic Equations and Inequalities
- Chapter 5: Direct and Inverse Proportion
- Chapter 6: Angle Properties and Straight Lines
- Chapter 7: Geometric Construction
- Chapter 8: Volume and Surface Area of Solids
- Chapter 9: Statistics
- Chapter 10: Probability

#### COURSE 3
- Chapter 1: Exponents
- Chapter 2: Scientific Notation
- Chapter 3: Algebraic Linear Equations
- Chapter 4: Lines and Linear Equations
- Chapter 5: Systems of Linear Equations
- Chapter 6: Functions
- Chapter 7: The Pythagorean Theorem
- Chapter 8: Geometric Transformations
- Chapter 9: Congruence and Similarity
- Chapter 10: Statistics
- Chapter 11: Probability
Everything you need to promote mastery of the Common Core

Core Components
Student Books focus on classroom learning, discussion, practice, and problem solving. Corresponding Teacher’s Editions provide support and teaching suggestions.

Assessments
Diagnostic chapter pretests help teachers plan instruction. Chapter tests in test-prep format provide formal assessment opportunities. Benchmark, Mid-Year, and End-of-Year assessments provide further measures of students’ mastery.

Family Letters and Activities includes newsletters in English and Spanish that promote family involvement with chapter vocabulary and concepts.

Differentiation Resources

For Transition
Transition Guide and Online Transition Map are intervention resources for students whose knowledge of prerequisite skills and concepts is weak.

English Language Learners
The simple language, clear drawings, and visual aspect of Math in Focus means the entire program is inherently accessible to English language learners. Additionally, the Teacher’s Edition provides lesson-specific suggestions for facilitating instruction for English language learners.

For Struggling Learners
Reteach provides more exposure to concepts for those students who need more time to master new skills or concepts. Additionally, the Teacher’s Edition provides tips for helping struggling students at point of use.

For On-Level Students
Extra Practice provides more practice to on-level students and are similar to the Practice exercises in the Student Books. Activity Book contains projects and activities to deepen students’ mathematical experiences.

For Advanced Students
Enrichment provides exercises for advanced students seeking challenge beyond exercises in the student books.
21st-Century technology enhances every lesson

Online Teacher’s Edition
The online Math in Focus Teacher’s Edition provides online planning and lesson support. Teachers can log on anytime from any computer with an internet connection.

Online Student Book
The online Math in Focus Student Book provides students access to their Student Book at school or from home.

ExamView® Test and Practice Generator CD-ROM
Create unlimited online customized tests and practice sets for students. Choose from multiple-choice, short-response, and extended-response test items correlated to the Common Core State Standards.

Teacher One Stop™ CD-ROM
Complete printable pdfs on a CD-ROM for ease of use and daily lesson planning.

Interactive Whiteboard Lessons
Specially designed interactive whiteboard lessons give you a digital option for teaching every lesson of the program.

Online Videos and Podcasts for Teachers and Parents
Teachers can access math background videos and author podcasts to prepare for lessons. Parents can learn more about Singapore math and how to help their children succeed.

Access to the eLearning Website
The Math in Focus eLearning website is a resource for teachers and parents. The website contains detailed information about Math in Focus and Singapore math, including overview presentations and implementation support. Visit hmhelearning.com to preview.

Courses 1–3 Manipulative Kit
(accommodates classrooms of up to 30 students)

The following materials are included in the Math in Focus Classroom Manipulative Kit for Courses 1–3.

<table>
<thead>
<tr>
<th>Manipulatives</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra Tiles Student Set</td>
<td>16 sets</td>
</tr>
<tr>
<td>Set of 32 pieces includes 4 squared variables, 8 variables, and 20 constants</td>
<td></td>
</tr>
<tr>
<td>Compasses</td>
<td>30</td>
</tr>
<tr>
<td>Set Squares (Drawing Triangles)</td>
<td>30</td>
</tr>
<tr>
<td>Protractors</td>
<td>30</td>
</tr>
<tr>
<td>Unit Cubes</td>
<td>500</td>
</tr>
<tr>
<td>Colorful, interlocking cubes make it easy to measure volume, mass, length, and more. Each cube measures 1 cm³ and has a mass of 1 gram.</td>
<td></td>
</tr>
<tr>
<td>Counters</td>
<td>4 sets</td>
</tr>
<tr>
<td>2-color (200 per set)</td>
<td></td>
</tr>
<tr>
<td>Blank Dice and Labels (Set of 36)</td>
<td>1 set</td>
</tr>
<tr>
<td>Rainbow Fraction Circles (Set of 51)</td>
<td>30 sets</td>
</tr>
</tbody>
</table>
multi-day lessons allow enough time for students to reach mastery.

Common Core correlations.

A skills trace highlights previous and future connections.

Before each chapter, refresh your knowledge of math concepts and Singapore math strategies with Math Background.

Planning ways to emphasize the Common Core Mathematical Practices is easy.

Types of Systems of Equations

- In this chapter, students learn about inconsistent systems and dependent systems.
- Graphs and tables of solutions
- Students learn to identify and describe conditions that result in one, zero, or infinitely many solutions in systems of linear equations.

Chapter 5 Systems of Linear Equations

Multiple Representations of Solutions

- In this chapter, students are introduced to systems of linear equations.
- From tables to equations to graphs
- Students are introduced to understanding, solving, and interpreting systems of linear equations in one variable. They are able to express their solutions using algebraic notation, tables, graphs, and graphs on the coordinate plane.
3.5 Factoring Algebraic Expressions

Lesson Objectives
- Factor algebraic expressions with two variables.
- Factor algebraic expressions with negative terms.

Factoring Algebraic Expressions with Two Variables.

You have had fun factoring an algebraic expression, such as \(2a - 4\). You can factor the algebraic expression using bar models or greatest common factor (GCF).

Method 1

Using the bar model, factor each term.

\[
3a \quad 4
\]

Factor the expression.

\[
3a \quad 4
\]

Keys:
- A bar between terms indicates a common factor.
- A bar between entire expressions indicates no factor common to both expressions.

From the bar model, \(3a - 4\) can be factored into three identical groups.

\[
3a \quad 4
\]

Method 2

Identify the expression, such as \(3a - 4\), using algebra tiles or GCF.

Simplify the expression.

\[
3a \quad 4
\]

Method 2

Identify the expression, such as \(3a - 4\), using algebra tiles or GCF.

Simplify the expression.

\[
3a \quad 4
\]

Factors:
- \(2\) from each term.
- \(2\) from each term.

The GCF of \(3\) and \(6\) is \(3\). Each section has three identical groups.

Rearrange the bar model to ensure the expression is factored correctly.

From the bar model, \(3a - 4\) can be factored into three identical groups.

\[
3a \quad 4
\]

Technology resources enhance instruction and aid in planning.

Pacing guides indicate how to spread instruction across multiple days.

5-minute Warm Ups get students ready for the lesson.

Differentiated Instruction and ELL Vocabulary Highlights help you reach all students.

Best practices provide tips and opportunities to incorporate manipulatives into instruction.
Lesson Objectives
• Factor algebraic expressions with two variables.
• Factor algebraic expressions with negative terms.

You can check that you have factored correctly by expanding $2(a - 2)$.

Factor Algebraic Expressions with Two Variables.

You have learned how to factor an algebraic expression, such as $2a - 4$. You can factor the expression by using the bar models or greatest common factor (GCF).

Method 1
Factoring $2a - 4$ results in an equivalent expression $2(a - 2)$.

From the bar model, $2a - 4 = 2(a - 2)$.

Method 2
Rewrite the expression.

$2a - 4 = (2a - 4) = (2a - 2) = 2(a - 2)$

Use the distributive property to factor 2 from each term.

You can also factor expressions with two variables, like $3a + 4b$, using models or GCF.

Method 1

$3a + 4b$

$3a + 2b$

From the bar model, $3a + 4b = (3a + 2b)$.

Method 2

$3a + 2b$

$3a + 2b$

$3a + 2b$

$3a + 2b$

You can check that you have factored correctly by expanding $3a + 2b$.
Mastery Learning

Discussion and journal writing promote higher-order thinking

### 3.1 Adding Algebraic Terms

**Lesson Objectives**
- Simplify algebraic expressions with decimal and fractional coefficients by adding like terms.
- Represent algebraic expressions using bar models.

**Represent Algebraic Expressions Using Bar Models.**

You have learned that to simplify an algebraic expression like $2x + 3$, where $x$ is a variable, you add the like terms:

- $2x$ is a variable.
- $3$ is a constant.

You can represent algebraic terms with decimal coefficients using bar models as shown:

![Bar Models for Algebraic Terms]

**Examples:**

- **Example a)**
  
  **Verbal Description:**
  
  A man drove $40$ miles per hour for the next $4.75$ hours.

  **Math Journals:**
  
  Think Math
  Give a reason why you write $\frac{1}{3}p$ or $0.5y$ instead of $\frac{1}{2}y$ or $y0.5$.

  **Math Journal**
  Each algebraic expression contains an error. Copy and complete the table.

<table>
<thead>
<tr>
<th>Verbal Description</th>
<th>Expression with Error</th>
<th>Description of Error</th>
<th>Correct Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>$25%$ of $x$ plus $\frac{1}{3}$ of $y$</td>
<td>$x + \frac{1}{3}y$</td>
<td>$\frac{1}{2}x - \frac{1}{2}$</td>
<td>$\frac{1}{2}x + \frac{1}{2}y$</td>
</tr>
<tr>
<td>$\frac{1}{2}$ of $x$ subtracted from $\frac{1}{3}$ of $y$</td>
<td>$\frac{1}{3}y - \frac{1}{2}x$</td>
<td>$\frac{1}{2}$</td>
<td>$\frac{1}{2}$</td>
</tr>
<tr>
<td>One more than half of $x$</td>
<td>$\frac{1}{2}x + 1$</td>
<td>$\frac{2}{3}x$</td>
<td>$\frac{2}{3}x$</td>
</tr>
<tr>
<td>$\frac{2}{3}$ divided by $\frac{1}{3}$</td>
<td>$\frac{2}{3} \div \frac{1}{3}$</td>
<td>$\frac{2}{3}$</td>
<td>$\frac{2}{3}$</td>
</tr>
</tbody>
</table>

**Hands-On Activities**

Hands-On Activities deepen learning and support Common Core Mathematical Practices

**Hands-On Activity**

1. Make a table like the one shown.
2. Take a yardstick and a pencil.
3. Stand 1 foot away from the yardstick. Look at the yardstick through the yardstick tube. How many inches of the yardstick can you see? Record the number of inches in the table. Then complete the table.
4. Repeat for the other values of 12 inches in the table. Then complete the table.

**Math Journal**

What happens to $H$ as $L$ increases? Based on your observations, do you think $H$ is directly proportional to $L$? Explain your thinking.

**Technology Activity**

1. Enter 15 data values in one row of cells.
2. Choose another cell for the mean.
3. Choose a cell for the mean absolute deviation.
4. Use the spreadsheet software’s function for finding the mean to find the mean of the 15 data values.
5. Enter 10 data values in one row of cells.
6. Use the spreadsheet software’s function for finding the mean absolute deviation.
7. Use the spreadsheet software’s function for finding the mean absolute deviation on the MAD of the data values
8. Explain what the MAD tells you about the data.
9. Enter a second set of data values and repeat.
10. Math Journal
    - Compare the two sets of data. Are the data values in each set clustered around the mean, or are they spread out? Then compare the mean absolute deviations for the two sets of data. What do you observe?
Mastery Learning

Mastery of concepts allows students to solve routine and non-routine problems

Brain @ Work

Bryan and his father are from Singapore, where the temperature is measured in degrees Celsius. While visiting downtown Los Angeles, Bryan saw a temperature sign that read 72°F. He asked his father what the equivalent temperature was in °C. His father could not recall the Fahrenheit-to-Celsius conversion formula, \( C = \frac{5}{9}(F - 32) \). However, he remembered that water freezes at 0°C or 32°F and boils at 100°C or 212°F.

Using these two pieces of information, would you be able to help Bryan figure out the above conversion formula? Explain.

Chapter Wrap Ups consolidate learning

Chapter Wrap Up

Concept Map

Key Concepts

- Algebraic expressions may contain more than one variable with rational coefficients and rational constants. Example: \( \frac{1}{2}x + 1.2u - 3.5 

- Algebraic expressions are written in simplest form by adding and subtracting the coefficients of like terms.

- Algebraic expressions may be simplified using the commutative property of addition.

- Algebraic expressions are expanded using the distributive property.

- Algebraic expressions are factored using the greatest common factor (GCF) of the terms and the distributive property.

- You can use diagrams, models, or tables to help solve real-world problems algebraically.
Differentiated Instruction
Support all learners with easy-to-use differentiation resources

Differentiated Instruction

Assessment and Intervention

STRENGTHENING LEARNERS

ASSESSMENT

• Quick Check to Meet Prior Knowledge
  - In Student Book A, p. 279–320
• Chapter 7 Pre-Test in Assessment

ON-GOING

• Guided Practice
• Lesson Check
• Total Cut the Door

END-OF-CHAPTER

• Chapter Review Test
• Chapter 7 Test, Mid-Course Test in Assessment
• Response Assessment Suite
• Diagnostic Assessment

ENGLISH LANGUAGE LEARNERS

Review the terms variable, algebraic expression, and binomial.

Say You can use a letter or a word to stand for a number or a quantity that can vary.

Here is a number sentence: 3 + 7 = 10. The numbers 3 and 7 are called numbers.

A variable is a symbol used to represent a number.

Model Show a bar model to show the algebraic expression.

For definitions, see Glossary page 273, and Online Multimedia Dictionary.

Practice 3.4

Expand and simplify each expression.

2x + 4(7 + 1)
3x - 5(1 - 3)
4x + 6(2 - 1)
5x - 7(3 - 2)

Practice 2.4

Assignment Guide

• All students should complete...
• Extra students may complete...
• All students should complete...
• Extra students may complete...

Resources for all levels

Struggling Learners

Reteach offers additional support for struggling students.

On-Level Learners

The Activity Book and Extra Practice are ideal for solidifying understanding for on-level students.

Advanced Learners

Enrichment offers challenging problems to extend learning.

Teacher’s Editions indicate the level of each practice problem to help monitor students’ progress.
Assessment

Prepare students for rigorous Common Core Assessments

The Assessments book, available in print and online, provides summative assessments including pretests, chapter tests, and benchmark tests. Assessments are designed to prepare students for the rigor the Common Core State Standards calls for, so both routine and non-routine problems are included.

The Examview Test and Practice Generator allows you to create unlimited assessments and includes Common Core test banks.

Transition

Fill prerequisite knowledge and skill gaps for a seamless transition to Singapore math

The Transition Guide provides math background information for teachers that address key concepts from a Singapore math perspective. Teaching strategies and student skill worksheets are also provided to fill student prerequisite knowledge gaps.

The Online Transition Resource Map also maps pretest assessment questions to previous grade-level content for easy access to transition support.
Learn more!
Log on to view virtual samples and preview online technology.

Virtual Samples
Visit hmheducation.com/singaporemath

Technology Preview
Evaluate online materials.

1. Go to preview.hrw.com
2. Enter sample word: mathinfocus
3. Fill in the required information and click Next
4. Select your school from the dropdown list and click Next; the system will auto-generate a user name and password with 120-day access
5. Write down your user name and password and go to my.hrw.com to log in

As the exclusive distributor of Math in Focus, Houghton Mifflin Harcourt Specialized Curriculum can provide customized professional development to ensure success for all students and teachers. Our dedicated team of Singapore math specialists looks forward to working with you to develop a plan that meets the needs of your district.

To learn more about Singapore math and related professional development opportunities:

Call 800.289.4490
Visit hmheducation.com/singaporemath
Your students deserve a world-class curriculum.

To learn more, or to review a virtual sample, visit: hmheducation.com/singaporemath
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