

Singapore Math:

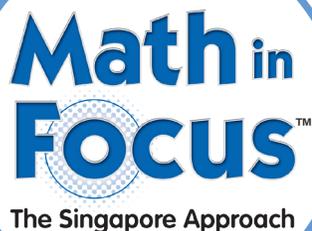
Math in Focus[™] and the Common Core Standards Draft Alignment Guide

Grades K to 5 Chapter Overview and Outline to Core Standards Draft

The Common Core State Standards for Mathematics is an initiative towards more focused grade level standards.

The research base used to guide the core standards draft noted conclusions from TIMSS, where Singapore has been a top scoring nation for 15 years. Apparent in the TIMSS and other studies of high-performing countries are a more coherent and focused curriculum.

The following is a guide identifying the critical chapters of *Math in Focus*—the U.S. Edition of Singapore’s most widely-used program, *My Pals are Here! Maths*—and their alignment to the March 9, 2010 public draft of the Common Core Standards for Mathematics. The grade level standards overviews from the public draft are cited along with the key chapters from *Math in Focus* that correspond to these topics and concepts.



Math in Focus[™]
The Singapore Approach

Mathematics | Kindergarten

In Kindergarten, instructional time should focus on two critical areas: (1) representing, comparing and ordering whole numbers and joining and separating sets; (2) describing shapes and space. More learning time in Kindergarten should be devoted to number than to other topics.

(1) Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; creating a set with a given number of objects; comparing and ordering sets or numerals; and modeling simple joining and separating situations with objects. They choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away.

(2) Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary. They identify, name, and describe basic shapes, such as squares, triangles, circles, rectangles, (regular) hexagons, and (isosceles) trapezoids, presented in a variety of ways (e.g., with different sizes or orientations), as well as three-dimensional shapes such as spheres, cubes, and cylinders. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

Common Core State Standards for Mathematics Draft: www.corestandards.org
© Copyright 2009 National Governors Association and Council of Chief State School Officers.

Math in Focus Grade K

The key ideas in the Common Core Standards are to read and write numbers, compare, and understand situations that involve putting together and taking apart numbers as well as recognizing the geometric world we live in. All of these are central to *Math in Focus*. Every topic listed in the standards is covered, including composing and decomposing numbers, comparing, and sorting. The addition and subtraction stories and equations are at the end of *Math in Focus* so it will be important to make sure teachers complete the book.

Critical chapters: All

Mathematics | Grade 1

In Grade 1, instructional time should focus on four critical areas: (1) developing understanding of addition, subtraction, and strategies for additions and subtractions within 20; (2) developing understanding of whole number relationships, including grouping in tens and ones, (3) developing understanding of linear measurement and measuring lengths, and (4) composing and decomposing geometric shapes.

(1) Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model “put together/take apart,” “add to,” “take from,” and “compare” situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (i.e., adding two is the same as counting on two). They use properties of addition (commutativity and associativity) to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., “making tens”) to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the inverse relationship between addition and subtraction.

(2) Students compare and order whole numbers (at least to 100), to develop understanding of and solve problems involving their relative sizes. They think of whole numbers between 10 and 100 in terms of tens and ones (especially recognizing the numbers 11 to 19 as composed of a ten and some ones). They understand the sequential order of the counting numbers and their relative magnitudes through activities such as representing numbers on paths of numbered things.

(3) Students develop an understanding of the meaning and processes of measurement, including underlying concepts such as partitioning (the mental activity of decomposing the length of an object into equal-sized units) and transitivity (e.g., in terms of length, if object A is longer than object B and object B is longer than object C, then object A is longer than object C). They understand linear measure as an iteration of units, and use rulers and other measurement tools with that understanding.

(4) Students compose and decompose plane and solid figures (e.g., put two congruent isosceles triangles together to make a rhombus), building understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine solid and plane figures, they recognize them from different perspectives and orientations, describe their geometric attributes, and determine how they are alike and different, to develop the background for measurement and for initial understandings of properties such as congruence and symmetry.

Common Core State Standards for Mathematics Draft: www.corestandards.org
© Copyright 2009 National Governors Association and Council of Chief State School Officers.

Math in Focus Grade 1

There is a direct correlation between these topics and **Math in Focus**. Every detail matches up, especially the focus on numbers. There are minor details such as use of greater and lesser symbols and fractions that are not in **Math in Focus**. But the big four topics—adding and subtracting whole numbers, place value and comparing numbers to 100, meaning of measurement, and composing and decomposing shapes—are covered completely and thoroughly.

There are a few areas where **Math in Focus** goes further than the Core Standards Draft. While the standards call for strategies and practice with addition and subtraction facts to 20, **Math in Focus** expects mastery. Students work with hundreds, as well as tens and ones.

Critical chapters: 2, 3, 4, 5, 7, 8, 9, 12, 13, 14, 15, 16, 17

Mathematics | Grade 2

In Grade 2, instructional time should focus on three critical areas: (1) developing understanding of base-ten notation; (2) developing fluency with additions and subtractions within 20 and fluency with multi-digit addition and subtraction; and (3) describing and analyzing shapes.

(1) Students develop an understanding of the base-ten system (at least to 1000). Their understanding of the base-ten system includes ideas of counting in units (twos, fives, and tens) and multiples of hundreds, tens, and ones, as well as number relationships, including comparing and ordering. They understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).

(2) Students use their understanding of addition to develop fluency with additions and subtractions within 20. They solve arithmetic problems by applying their understanding of models for addition and subtraction (such as combining or separating sets or using number lines that begin with zero), relationships and properties of numbers, and properties of addition. They develop, discuss, and use efficient, accurate, and generalizable methods to compute sums and differences of two-digit whole numbers. They select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences. They develop fluency with efficient procedures, including standard algorithms, for adding and subtracting whole numbers; understand and explain why the procedures work based on their understanding of base-ten notation and properties of operations; and use them to solve problems.

(3) Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two- and three-dimensional shapes, students develop a foundation for understanding attributes of two- and three-dimensional space such as area and volume, and properties such as congruence and symmetry that they will learn about in later grades.

Common Core State Standards for Mathematics Draft: www.corestandards.org

© Copyright 2009 National Governors Association and Council of Chief State School Officers.

***Math in Focus* Grade 2**

Grade 2 also matches up exceedingly well with the Core Standards Draft. Number is especially well covered, including both the standard algorithm and the mental strategies. The properties and application of addition and subtraction match up exceedingly well. There are minor details such as time duration and the inclusion of rhombuses that are missing in ***Math in Focus***, but the big ideas in measurement—use of metric and customary units to measure length, and recognition of plane figures—are covered.

There are a few topics in which ***Math in Focus*** goes further than the standards. As stated previously, ***Math in Focus*** expects mastery of basic addition and subtraction facts to 20 in first grade. Also, ***Math in Focus*** introduces multiplication and division, and the learning of certain facts in second grade, while the standards ask for this in third grade.

Critical chapters: 1, 2, 3, 4, 7, 11, 12, 13, 14, 17, 19

Mathematics | Grade 3

In Grade 3, instructional time should focus on four critical areas: (1) developing understanding of multiplication and division and strategies for multiplication and division within 100; (2) developing understanding of fractions, starting with unit fractions; (3) developing understanding of the structure of rectangular arrays and of area; and (4) describing and analyzing two-dimensional shapes. Multiplication, division, and fractions are the most important developments in Grade 3.

(1) Students develop an understanding of the meanings of multiplication and division of whole numbers through the use of representations such as equal-sized groups, arrays, area models, and equal jumps on number lines for multiplication; and successive subtraction, partitioning, and sharing for division. Through this process, numbers themselves take on new meaning and are no longer only counters for single objects. They represent groups, a number of groups (for example, 3 teams of 6 people), or a comparative factor (3 times as long).

Students use properties of operations to calculate products of whole numbers. They use increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the inverse relationship between multiplication and division.

(2) Students develop an understanding of a definition of a fraction, beginning with unit fractions. They use fractions to represent parts of a whole or distances on a number line that begins with zero. Students understand that the size of a fractional part is relative to the size of the whole (for example, $\frac{1}{4}$ of a mile is longer than $\frac{3}{4}$ of a foot, even though $\frac{1}{4} < \frac{3}{4}$), and they are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing and ordering fractions using by models or strategies based on noticing common numerators or denominators.

(3) Students recognize area as an attribute of two-dimensional regions. They understand that area can be quantified by finding the total number of same-size units of area required to cover the shape without gaps or overlaps. They understand that a 1-unit by 1-unit square is the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area measure to the area model used to represent multiplication, and they use this connection to justify using multiplication to determine the area of a rectangle. Students contrast area with perimeter.

(4) Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify the shapes by their sides and angles, and connect these with definitions of shapes. Students investigate, describe, and reason about decomposing and combining polygons to make other polygons. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of attributes and properties of two-dimensional objects.

Common Core State Standards for Mathematics Draft: www.corestandards.org

© Copyright 2009 National Governors Association and Council of Chief State School Officers.

**Math in
Focus™**

The Singapore Approach

Math in Focus Grade 3

Grade 3 is particularly well aligned with Core Standards Draft. The focus of **Math in Focus** and the standards is in the following areas: multiplication and division, fractions, area, and classification of plane shapes. Unit fractions and equivalent fractions are covered extensively, as are the properties of multiplication. The number line plays a prominent role in the teaching of fractions. There is nothing missing from the third grade **Math in Focus**.

Math in Focus does include more measurement than is asked for in the standards, including volume and mass. In addition, **Math in Focus** teaches the multiplication facts for 6, 7, 8, and 9, which the standards call for in fourth grade.

Critical chapters: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19

Mathematics | Grade 4

In Grade 4, instructional time should focus on four critical areas: (1) continuing to develop understanding and fluency with whole number multiplication, and developing understanding of multi-digit whole number division; (2) developing an understanding of addition and subtraction of fractions with like denominators, multiplication of fractions by whole numbers, and division of whole numbers with fractional answers; (3) developing an understanding of area; and (4) understanding that geometric figures can be analyzed and classified using properties such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

(1) Students use understandings of multiplication to develop fluency with multiplication and division within 100. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models, equal intervals on a number line), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate products or mentally calculate products. They develop fluency with efficient procedures, including the standard algorithm, for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate quotients and mentally calculate quotients, depending upon the context and the numbers involved.

(2) Students develop understanding of operations with fractions. They apply their understandings of fractions as built from unit fractions, and use fraction models to represent the addition and subtraction of fractions with like denominators. Students use the meaning of fractions and the meaning of multiplication to understand and explain why the procedure for multiplying a fraction by a whole number makes sense. They understand and explain the connection between division and fractions.

(3) Students develop their understanding of area. They understand and apply the area formula for rectangles and also find areas of shapes that can be decomposed into rectangles. They select appropriate units, strategies (e.g., decomposing shapes), and tools for solving problems that involve estimating and measuring area.

(4) Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

Common Core State Standards for Mathematics Draft: www.corestandards.org

© Copyright 2009 National Governors Association and Council of Chief State School Officers.

Math in Focus Grade 4

Similar to previous grades, **Math in Focus** has a very high correlation with the standards for this grade level. The focus of both the standards and **Math in Focus** is on multiplication and division, including multi-digit multiplication, deepening of fractional understanding (including equivalent fractions), and addition and subtraction of fractions, as well as understanding of decimals. It also includes understanding of angles, area, and perimeter formulas and line symmetry.

Math in Focus goes somewhat further in that multiplication facts were memorized in third grade, not fourth. Also, there are a few multiplication problems that involve 2-digit by 3-digit problems. Addition and subtraction of fractions goes further than required and addition and subtraction of decimals is included in **Math in Focus**. Both of these are included in the fifth grade standards. Also, rotational as well as line symmetry is taught.

Critical chapters include: 1, 2, 3, 4, 6, 7, 9, 10, 11, 12, 13

Mathematics | Grade 5

In Grade 5, instructional time should focus on four critical areas: (1) developing fluency with addition and subtraction of fractions, developing understanding of the multiplication of fractions and of division of fractions in limited cases (fractions divided by whole numbers and whole numbers divided by unit fractions); (2) developing understanding of and fluency with division of multi-digit whole numbers; (3) developing understanding of and fluency with addition, subtraction, multiplication, and division of decimals; and (4) developing understanding of volume.

(1) Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the inverse relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing fractions by whole numbers and whole numbers by unit fractions.)

(2) Students develop fluency with division of whole numbers; understand why procedures work based on the meaning of base-ten notation and properties of operations; and use these procedures to solve problems. Based on the context of a problem situation, they select the most useful form of the quotient for the answer and interpret it appropriately.

(3) Students apply their understandings of models for decimals, decimal notation, and properties of operations to compute sums and differences of finite decimals. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of finite decimals efficiently and accurately.

(4) Students recognize volume as an attribute of three-dimensional space. They understand that volume can be quantified by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve problems.

Common Core State Standards for Mathematics Draft: www.corestandards.org

© Copyright 2009 National Governors Association and Council of Chief State School Officers.

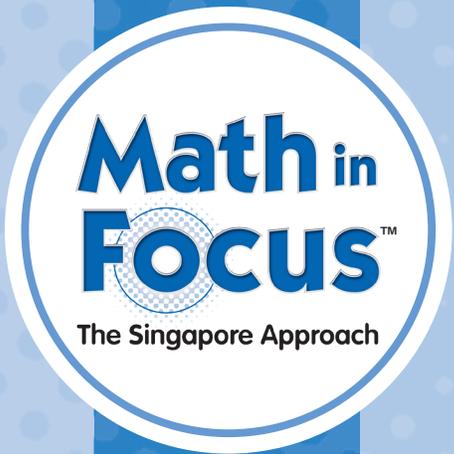
Math in Focus Grade 5

Grade 5 standards are very comprehensive and parallel **Math in Focus** priorities. These include long division, four operations with fractions and decimals, understanding of the algorithms, volume, dot plots, and the coordinate grid in the first quadrant. Every key topic is covered.

However, in Grade 5, **Math in Focus** does contain a number of topics that are in the sixth grade Core Standards Draft. These include ratios, percents, area of triangles (including non-right triangles), algebraic expressions, and surface area. This can prepare students for an accelerated program, but it will need careful planning to ensure that teachers and students are not overwhelmed by it.

Critical chapters: 1, 2, 3, 4, 8, 9, 11, 14, 15





© Houghton Mifflin Harcourt Publishing Company. All rights reserved. Printed in the U.S.A. 03/10 RR-6019
Math in Focus™ is a trademark of Times Publishing Limited.

 **Marshall Cavendish**
Education

**GREAT
SOURCE®**
 HOUGHTON MIFFLIN HARCOURT

800.289.4490
www.hmheducation.com/mathinfocus