

Singapore Math: Place Value in Math in Focus

**Math in
Focus**TM
The Singapore Approach

There are several skills that are critical to mathematics success in the elementary grades. Among them are an understanding of number, number sense, and place value. Place value is the system of writing numerals in which the value of the digit is determined by its position, or relationship to the other digits. These values are multiples of a common base of 10 in our decimal system. In Singapore, where students consistently out perform American students in math, place value is considered a foundational skill for all mathematics learning.

The U.S. edition of Singapore's math curriculum, **Math in FocusTM: The Singapore Approach**, stresses mastery, coherence, and focus. Students master foundational math skills early and carry those skills with them as they progress through the grades. With each new concept learned, students build on what they have already learned. This systematic approach to mathematics is particularly evident in the program's approach to teaching place value. From grade level to grade level, place value is developed, honed, and applied to operations. As a result, numbers are demystified and students excel in mathematics because, for them, numbers become tools for solving problems rather than obstacles that cause frustration.

Throughout **Math in Focus**, a concrete-pictorial-abstract approach encourages students to use place value blocks, chips, charts, and strips to create an association between the physical representation of numbers, the number symbol, and the number name, and later to perform arithmetic operations using these materials. These concrete and pictorial representations add meaning to numbers so that when students progress to the abstract, they have an understanding of what the numbers stand for. This way students experience problem solving as more than just a process, there is real meaning behind the elements of a problem.

In Grade 1, place value is developed in a coherent, focused manner to stress the importance of the number 10 and help students master it. Grade 1, Chapter 1 begins with the study of the set of numbers from 0 to 10. This is followed by an introduction to number bonds, showing the additive relationship between numbers less than 10 and, in later chapters, adding and subtracting up to 10. In these chapters, students come to understand 10 as an anchor number for future applications of sums and differences with 10 and multiples of 10.

Add.
Use number bonds to help you.

7 How many monkeys are there in all?



There are monkeys in all.

You can add in any order.

$$\square + \square = \square + \square$$

4 added on to 3 is equal to 7.
 added on to is
also equal to 7.



50 Chapter 3 Addition Facts to 10

Place value is introduced with numbers to 20, in a chapter that examines all “teen” numbers (11 to 19) as “10 plus numbers.” This helps students master two major concepts that will play a pivotal role in their future mathematics learning:

1. Seeing all two-digit numbers as composed of tens and more
2. Understanding expanded notation—10 + 1 or 1 ten plus 1, 10 + 2 or one ten plus two, 10 + 3 or one ten plus three, and so on.

Next comes a chapter focused on practice with addition and subtraction to 20, which helps to solidify students’ understanding of 10 as an anchor number, the place value of numbers to 20, and adding and subtracting of numbers to 20.

Guided Practice
Make a 10.
Then add.
Use number bonds to help you.

1 $9 + 5 =$ 2 $8 + 7 =$

Let's Practice

Make a 10.
Then add.

1 $9 + 4 =$

2 $7 + 9 =$

3 $9 + 8 =$

4 $8 + 3 = 10 +$
 $=$

5 $6 + 8 =$ +
 $=$

ON YOUR OWN
 Go to Workbook A:
 Practice 1, pages 191–196

Lesson 1 Ways to Add 197

Grade 1A, Chapter 8, page 197

By the second half of Grade 1, students using *Math in Focus* have developed a solid understanding of place value with numbers to 20. As the year progresses, the concept of place value continues to be developed with a chapter devoted to numbers to 40, followed by addition and subtraction to 40. In this chapter students begin their study of regrouping, which is clearly based on their earlier study of place value up to 40. Previously, students learned to make a ten and learned how to use number bonds. These foundational skills enable them to begin working with multi-digit numbers. Focusing only on numbers to 40 allows students to associate numerals with easily managed quantities of physical materials while the place value concept is developed.

In Grade 1, the study of place value concludes with the study of numbers to 100 with addition and subtraction. At this point, students are fully prepared to expand their understanding to three digits because of the gradual, strategic way in which it has been introduced, understood, and practiced. In addition, first-grade students are taught mental math in a chapter which calls on their knowledge of number bonds with 10 and multiples of 10 to solve mental computation problems.

You can add tens mentally using the 'add the tens' strategy.
 Find $23 + 10$.
 Group 23 into tens and ones.

Step 1 Add the tens. $20 + 10 = 30$
Step 2 Add the result to the ones. $3 + 30 = 33$
 So, $23 + 10 = 33$.

Guided Practice
Add mentally.
Use number bonds to help you.

1 Find $15 + 20$.
 Group 15 into tens and ones.

Step 1 Add the tens. $10 +$ =
Step 2 Add the result to the ones. + =
 So, $15 + 20 =$

5 Find $29 + 10$.

138 Chapter 14 Mental Math Strategies

Grade 1B, Chapter 14, page 138

In Grade 2, students study how to count, read and write numbers up to 1,000, and learn to add and subtract numbers to 1,000 with and without regrouping. Here place value is key to understanding why the algorithms work. Students learn how the place value ideas they learned in Grade 1 can be applied to the thousands place by using place value blocks. In addition, there is a chapter that teaches mental math strategies for adding and subtracting three-digit numbers without the use of paper and pencil. This solidifies students’ understanding of place value.

You can add tens to a 3-digit number mentally using the 'add the tens' strategy.
 Find $213 + 50$.
 Group 213 into tens, and hundreds and ones.

Step 1 Add the tens. $10 + 50 = 60$
Step 2 Add the result to the hundreds and ones. $203 + 60 = 263$
 So, $213 + 50 = 263$.

Guided Practice
Add mentally.
Use number bonds to help you.

10 Find $351 + 40$.
 Group 351 into tens, and hundreds and ones.

Step 1 Add the tens. + $40 =$
Step 2 Add the result to the hundreds and ones. $301 +$ =
 So, $351 + 40 =$

11 $237 + 50 =$ 12 $613 + 70 =$

12 Chapter 10 Mental Math and Estimation

Grade 2B, Chapter 10, page 12

In Grade 3, the place value chart is extended to the ten thousands place. Predictably, the study of addition and subtraction in the ten thousands place follows. The depth of development of place value in Grade 3 directly correlates to the depth of development in Singapore Math. The chapter teaches the following skills:

1. Count, read, and write numbers to 10,000.
2. Learn to count by ones, tens, hundreds, and thousands.
3. Show representations of numbers up to 10,000 using place value charts and place value strips.
4. Identify the place value of each digit in the number and express the number in standard, word, and expanded forms.
5. Compare and verbally describe sets of numbers using the terms least and greatest.
6. Write five-digit numbers in increasing or decreasing order.
7. Apply the number and place value concepts to identify and complete number patterns and find missing numbers on a number line.

Guided Practice
How many are there? Find the missing numbers.

Thousands	Hundreds	Tens	Ones
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

- 1,329 = thousand hundreds tens ones
- $1,329 = \text{} + \text{} + \text{} + \text{}$
- In 1,329, the digit is in the thousands place. it stands for . its value is .

Find each missing number or word. Use base-ten blocks to help you.

- In 2,548, the digit is in the hundreds place. the digit 4 stands for . the value of the digit 8 is .
- In 2,562, the values of the digit 2 are: $\text{} \leftarrow \text{2, 5 6 2} \rightarrow \text{}$

14 Chapter 1 Numbers to 10,000

Grade 3, Chapter 1, page 14

Throughout **Math in Focus**, students develop fluency in understanding numbers in multiple place value representations; for example, two thousand five hundred is 25 hundreds or 250 tens.

In the later chapters of Grade 3, students explore strategies for mental math and addition and subtraction for numbers to 10,000. These are the final chapters exploring place value addition and subtraction. In Grades 4 and 5, students continue to explore place value, but now with an emphasis on multiplication and division, and decimals.

Hundreds	Tens	Ones	Step 3
			Multiply the hundreds by 3. 2 hundreds \times 3 = 6 hundreds
$200 \times 3 = 600$	$30 \times 3 = 90$	$2 \times 3 = 6$	$2 \times 3 = 6$ $30 \times 3 = 90$ $200 \times 3 = 600$ Total = 696

Multiplying with regrouping in hundreds, tens, and ones
Find 125×7 .

Step 1
Multiply the ones by 7.
5 ones \times 7 = 35 ones
Regroup the ones. 35 ones = 3 tens 5 ones

$$\begin{array}{r} 125 \\ \times 7 \\ \hline 5 \end{array}$$

Step 2
Multiply the tens by 7.
2 tens \times 7 = 14 tens
Add the tens. 14 tens + 3 tens = 17 tens
Regroup the tens. 17 tens = 1 hundred 7 tens

$$\begin{array}{r} 125 \\ \times 7 \\ \hline 75 \end{array}$$

Step 3
Multiply the hundreds by 7.
1 hundred \times 7 = 7 hundreds
Add the hundreds. 7 hundreds + 1 hundred = 8 hundreds
So, $125 \times 7 = 875$.

$$\begin{array}{r} 125 \\ \times 7 \\ \hline 875 \end{array}$$

72 Chapter 3 Whole Number Multiplication and Division

Grade 4A, Chapter 3, page 72

In Grade 4, students extend their understanding of the place value system to the hundred thousands place and decimals to hundredths. Again, fluency with place value is emphasized as students learn to understand. For example, students see 38.2 as 38 and 2 tenths, or 3 tens and 82 tenths, or 382 tenths, and can then apply their knowledge of place value to multiplication, division, and mental math.

Guided Practice
Express each of these as a decimal.

- $\frac{6}{100}$ oz = oz
- $\frac{16}{100}$ in. = in.
- five hundredths =
- 8 hundredths =

Find the decimals that the shaded parts represent.

-
-

Find the decimal for each point on the number line.

-

Find equivalent tenths and hundredths.

$\frac{10}{100}$ is equal to $\frac{1}{10}$ or 0.1.
10 hundredths = 1 tenth.
You can regroup 10 hundredths as 1 tenth.

14 Chapter 7 Decimals

Grade 4, Chapter 7, page 14

By Grade 5, students extend their understanding of the place value system to the millions place and the decimal places to thousandths. The focus is on division by two-digit numbers, decimal addition and subtraction, and multiplying and dividing decimals by whole numbers. As is the case throughout *Math in Focus*, place value is still the focus. For example, in learning how to multiply 0.6 by 8, students learn to think of the problem as multiplying 6 tenths by 8 to get 48 tenths, which is regrouped to form 4 and 8 tenths, or 4.8.

Divide decimals with one decimal place by a whole number with regrouping.

Divide 0.8 by 5.

Step 1
Divide the ones by 5.
 $0 \text{ ones} \div 5 = 0 \text{ ones}$

Step 2
Divide the tenths by 5.
 $8 \text{ tenths} \div 5 = 1 \text{ tenth R } 3 \text{ tenths}$

Regroup the remainder 3 tenths.
 $3 \text{ tenths} = 30 \text{ hundredths}$

Step 3
Divide the hundredths by 5.
 $30 \text{ hundredths} \div 5 = 6 \text{ hundredths}$

So, $0.8 \div 5 = 0.16$.

Lesson 9.3 Dividing Decimals 53

Grade 5B, Chapter 9, page 53

Conclusion

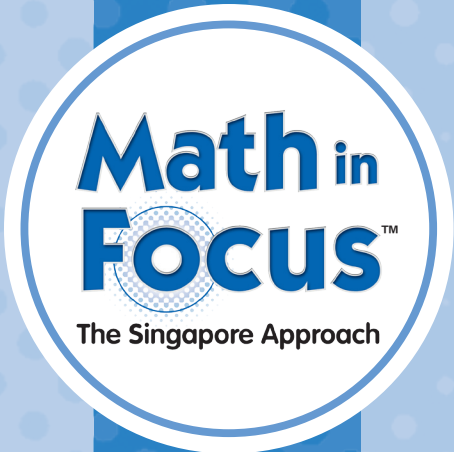
In *Math in Focus* place value is presented in a systematic and focused manner. From the very beginning students understand numbers as a system of tens. This system lays the foundation for all future lessons including computation skills, problem solving, the decimal system, and more.

Mastery of math in the elementary grades is key for student success in the classroom and in the 21st century working world they will eventually enter. Since the 1980s, students in Singapore have consistently outscored U.S. students in math. Now, with *Math in Focus*, U.S. students can learn using the same effective manner with which students in Singapore have had such success, preparing them for a lifetime of deep mathematics understanding and real-world problem solving.

About the Author

Patsy F. Kanter is an author, teacher, and international math consultant. She worked as the Lower School Math Coordinator and Assistant Principal at Isidore Newman School in New Orleans, Louisiana, for 13 years. Kanter is the author of a number of mathematics programs, including *Afterschool Achievers: Math Club* (K–8) and *Summer Success®: Math* (K–8), and co-author of *Every Day Counts®: Calendar Math*, *Partner Games* (K–6), and *Practice Counts* (1–6). She is a consulting author for *Math in Focus*, which is the U.S. version of Singapore's *My Pals Are Here! Maths*. Both programs are published by Marshall Cavendish, Singapore (part of Times Publishing Limited).





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