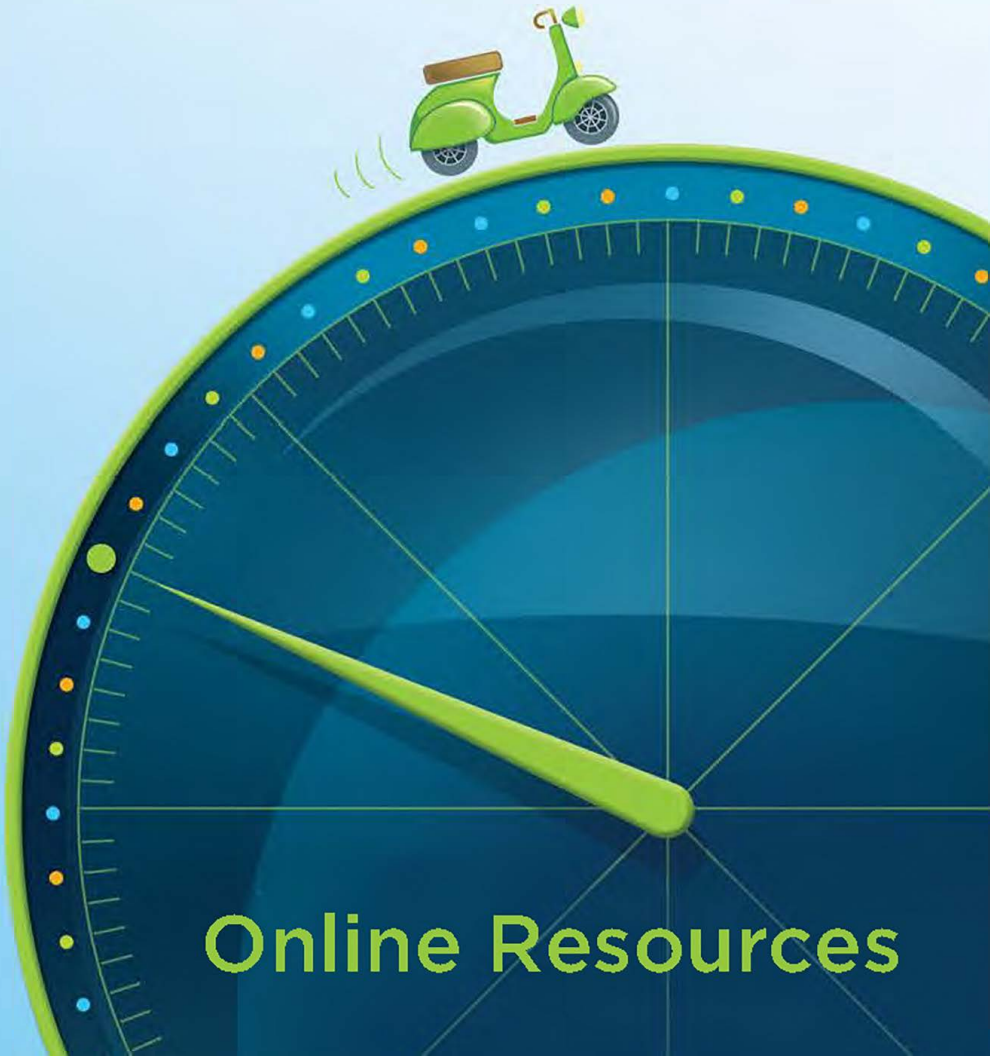
MathNavigator™
Common Core

Place Value and Computational Strategies to Millions



Online Resources

AMERICA'S CHOICE®

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Introduction to Math Navigator

Dear Parent/Guardian,

_____ has been selected to participate in Math Navigator! Math Navigator is one of the ways that our school is working to help all students succeed in mathematics. The program gives students the additional time and instruction they need to improve their performance in this important subject.

Your child will be participating in the *Place Value and Computational Strategies to Millions* module. The main goal of this module is to help students calculate numbers to millions fluently. In order to do so, students will need to have a strong understanding of place value. In this module, students will read, write, and interpret numbers to 1,000,000 using base-ten numerals, number names, and expanded form. They will round and compare multidigit whole numbers based on the meanings of the digits in each place. Students will use strategies based on place value, properties of operations (in particular the distributive property), and the relationship of operations to add, subtract, multiply, and divide multidigit whole numbers. Students will explain and discuss different strategies and generalize how these methods can be applied accurately to different situations. Students will become fluent using different computation procedures and will be able to reason why the procedures work, using equations, place-value tables, or diagrams to support their thinking. They will recognize patterns when multiplying with 10 and 100 and will apply those patterns when solving problems. After solving problems, students will learn to assess the reasonableness of their answers using mental computation and estimation strategies, including rounding.

There are a variety of materials students will use with this module: one of them is a set of Study Cards. These cards include mathematical ideas for students to master, game cards, and blank cards that students can customize with concepts that they need to work on. Students are encouraged to use these cards during the lessons, as well as during free time and at home. Please encourage your child to share them with you.

The more enthusiastic you can be about Math Navigator, the more it will help your child. Ask questions each day about what your child learned and how the Math Navigator class was different from your child's regular math class. It is important for you to acknowledge what your child has accomplished both on a day-to-day basis and after completing the Math Navigator module.

We are excited about using Math Navigator with students. Learn more about this special program and how it works by reading the short description that follows. If you have any questions about the program, please do not hesitate to contact us here at school.

How Math Navigator Works

Structure of a Module

Each module contains 20 days of 30- or 45-minute lessons, including a pre-test and post-test. During the 20 days, students have two or three checkpoint lessons that assess their understanding of the concepts in the module.

Frequent Skills Practice

Most lessons include a Show Me session in which students practice and reinforce skills. It is also a time for students to learn strategies and techniques that make computation easier.

Emphasis on Understanding

The lessons are carefully designed to uncover mistakes that result from students misunderstanding something. We call such mistakes *misconceptions*. Misconceptions need to be corrected because they can interfere with new learning. Math Navigator modules do not attempt to reteach everything that students have learned about a topic. Instead, they help students understand the mathematics of the procedures and concepts that they have already learned so that they can correct the misconceptions that are getting in the way of their progress.

Learning to Think Mathematically

Lessons are structured to teach students to think like mathematicians. Students will learn how to ask themselves questions before beginning a problem; to use diagrams, tables, and other methods of representing problems; and to estimate as a way of determining whether their answers are reasonable. Most importantly, they will come to see that mistakes are opportunities for learning, rather than something to hide.

Misconceptions and Errors

PV1	Does not understand or misinterprets the role of zero as a placeholder
PV2	Does not represent a number correctly in different forms: expanded, words, place value, numerical
PV3	Ignores place value and treats each digit as a separate number
PV5	Confuses place value in whole numbers
PV6	Does not understand that the value of any digit in a number is a combination of the face value of the digit and the place
PV7	Orders numbers based on the value of the digits, instead of place value
G3	Rounds incorrectly
G5	Misapplies the rule for rounding up and changes the digit in the designated place while leaving the digits in smaller places as they are.
O14	Does not recognize or misapplies the commutative property
O15	Misapplies the procedure for regrouping
O16	Does not recognize or misapplies the associative property
O17	Estimates incorrectly
O24	Does not recognize or misapplies the distributive property
O33	Subtracts the smaller number from the larger one, digit by digit
D13	Multiplies or divides incorrectly by a power of ten
F12	Treats each place value of a whole number separately when multiplying and dividing

PV1 Does not understand or misinterprets the role of zero as a placeholder

example

Tamika wrote this amount on a check:

two hundred four dollars

Which number represents this amount?

24

PV2 Does not represent a number correctly in different forms: expanded, words, place value, and numerical

The student has limited his understanding of numbers to one or two representations or applies the alternate conception "Write the numbers you hear" when writing numbers in standard form when given the number in words.

example

Write the number *five hundred eleven* in standard form.

500,11

Write the number 83 in expanded form.

8 + 3

PV3 Ignores place value and treats each number as a separate number

The student adds or subtracts each place without regrouping, and then writes the total of the parts all as one number or some variation of that.

example

Write the number for thirty-two.

$$\begin{array}{r} 12 \\ +9 \\ \hline 111 \end{array}$$

PV5 Confuses place value in whole numbers

The student recognizes simple multidigit numbers, such as thirty (30) or 400 (four hundred), but she does not understand that the position of a digit determines its value.

example

Read 306.

Thirty-six

Write the numeral for four hundred eight.

4,008

PV6 Does not understand that the value of any digit in a number is a combination of the face value of the digit and the place

example

What is the value of the digit 7 in the number 742?

one hundred

PV7 Orders numbers based on the value of the digits, instead of place value.

example

69 > 102, because 6 and 9 are bigger than 1 and 2.

G3 Rounds incorrectly

example

Round 762,398 to the nearest ten thousand.

750,000

G5 Misapplies the rule for rounding up, and changes the digit in the designated place while leaving digits in smaller places as they are

example

Round 127,884 to the nearest thousand.

128,884

O14 Does not recognize or misapplies the commutative property

The student may know the commutative property of multiplication but fails to apply it to simplify the "work" of multiplication.

example

Student states that $9 \times 4 = 36$ with relative ease:
but struggles to find the product of $4 \times 9 = ?$

O15 Misapplies the procedure of regrouping

The student does the first step (multiplying by ones) correctly, but the same numbers are used for regrouping again when multiplying by 10s whether it is appropriate or not.

example

```
   3
  37
 × 65
 185
+ 2,120
 2,305
```

```
 1 4 0
 128
 × 75
 640
+ 8,860
 9,500
```

O16 Does not recognize or misapplies the associative property

The student may know the associative property of multiplication but fails to apply it to simplify the "work" of multiplication. The student labors to find the product of three or more numbers, because he fails to recognize that it is much easier to multiply the numbers in a different order.

example

$8 \times 13 \times 5 =$

```
   8
 × 13
  24
+ 80
 104  × 5 = 500 + 20 = 520
```

O17 Estimates incorrectly

example

Estimate the sum of 2,560 + 680.

9,000

O24 Does not recognize or misapplies the distributive property of multiplication

The student does not understand the distributive property and does not know how to apply it to simplify the "work" of multiplication. The student has reasonable facility with multiplication facts but cannot use the distributive property to simplify multiplication.

example

$15 \times (2 + 10) =$

$$\begin{array}{r} 15 \\ \times\ 12 \\ \hline 10 \\ 20 \\ 50 \\ +\ 100 \\ \hline 180 \end{array}$$

O33 Subtracts the smaller number from the larger one, digit by digit

example

$$\begin{array}{r} 62{,}483 \\ -\ 58{,}575 \\ \hline 16{,}112 \end{array}$$

D13 Multiplies or divides incorrectly by a power of ten

The student cannot quickly multiply by a power of ten by understanding the relationship between multiplication and place value.

example

$300 \times 10 =$ 30,000

```
     300
   × 500
      00
   0,000
     + 15
15,000,000
```

F12 Treats each place value of whole number, decimals and/or fractions separately when multiplying and dividing

example

```
  34        128
× 62        × 71
 188        848
```

Class Profile Instructions

About the Class Profile

Completing an analysis of student work gives you a clear picture of the strategies an individual student is applying to a particular problem or topic in mathematics. Such an analysis is even more powerful when it is applied to the Math Navigator class as a whole.

The Class Profile gives you both. By reading the Class Profile across a row, you can see where each student stands at any point in time. Reading down the columns allows you to see the strengths and needs of the entire class at a glance. By reviewing the Class Profile, you will be able to make decisions that target appropriate instruction to individuals, small groups, and the whole Math Navigator class.

The first pages of the Class Profile provide assessment items related to the content of the module. The last page is based on the mathematical practices from the Common Core State Standards for Mathematics.[1] On this page, record evidence of students using these practices.

Recording Data on the Class Profile

When you see—either through discussion, analysis of student work, or direct observation—that a student understands a concept, still has a misconception, or engages in a mathematical practice, make a note on your Class Profile. As the student's understanding increases, update the Class Profile.

Using the Class Profile

Review the Class Profile periodically during the lesson to help you decide which topics would be most beneficial for your students to focus on during the class discussion. Address topics that most of the students in the Math Navigator group need to learn during the show me, work time, or probing for understanding parts of the lesson. Address topics that only some students are struggling with during partner work or in conferences. If only one or two students need help with a topic, address the topic in an individual conference.

Give a copy of the completed Class Profile to each student's classroom teacher at the end of the module.

[1] Common Core State Standards Initiative. 2010. "Common Core State Standards for Mathematics": 6–8. Accessed July 1, 2011. http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf.

CLASS PROFILE (1 OF 3)

Student Name	Concepts						
	C1: Understands the concept of place value for whole numbers and that a digit in one place represents 10 times what it represents in the place to its right	**C2:** Applies place value understanding to compare multidigit numbers	**C3:** Applies place value understanding to round numbers	**C4:** Adds multidigit whole numbers using strategies based on place value, properties of operations, and the relationship of addition to subtraction	**C5:** Subtracts multidigit whole numbers using strategies based on place value, properties of operations, and the relationship of addition to subtraction	**C6:** Uses place value understanding to explain patterns in the number of zeros of the product when multiplying a number by multiples of 10	**Observed Errors**
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

CLASS PROFILE (2 OF 3)

Student Name	Concepts and Procedures						
	C7: Multiplies multidigit whole numbers using strategies based on place value and properties of operations, in particular the distributive property	**C8:** Divides numbers involving multidigit dividends using strategies based on place value and properties of operations, in particular the distributive property	**C9:** Identifies arithmetic patterns in the multiplication table, and explains them using properties of operations	**P1:** Reads and writes multidigit whole numbers using base-ten numerals, names, and expanded form	**P2:** Adds multidigit whole numbers using the standard algorithm	**P3:** Subtracts multidigit whole numbers using standard algorithm	**Observed Errors**
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

CLASS PROFILE (3 OF 3)

Mathematical Practice Standards

MP1: Make sense of problems and persevere in solving them.

MP2: Reason abstractly and quantitatively.

MP3: Construct viable arguments and critique the reasoning of others.

MP4: Model with mathematics.

MP5: Use appropriate tools strategically.

MP6: Attend to precision.

MP7: Look for and make use of structure.

MP8: Look for and express regularity in repeated reasoning.

Student Name	Observations
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

A Complete Solution to a Word Problem

includes all of the following ...

- ✓ A written estimate
- ✓ All work that you do
- ✓ An equation (even if you solved it using column form)
- ✓ A diagram, number line, table, or other representation
- ✓ The answer to the question in a complete sentence

What to Do If You Get Stuck

- ✓ Look at past work times
- ✓ Look at the charts that are posted
- ✓ Model the problem using counters or other materials
- ✓ Sketch a diagram or other representation
- ✓ Change the numbers to make the problem simpler
- ✓ Write what you do know
- ✓ Write down questions to ask later
- ✓ Check other resources