

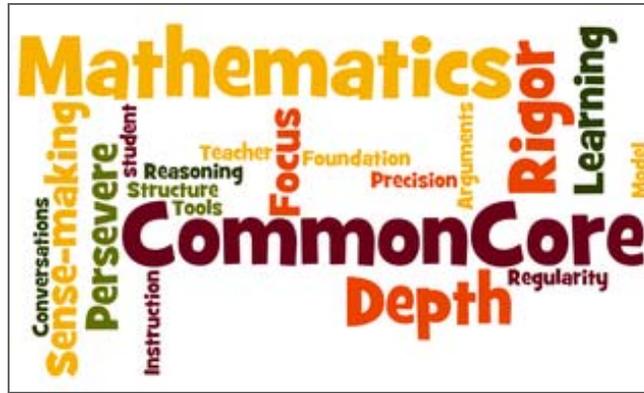


West Genesee Mathematics

A Parent's Guide to Kindergarten Mathematics



Compiled by Teachers at East Hill Elementary School



Dear Parents,

This guide is intended to better acquaint you with the Common Core Learning Standards for Kindergarten Mathematics. It has been compiled from several different sources.

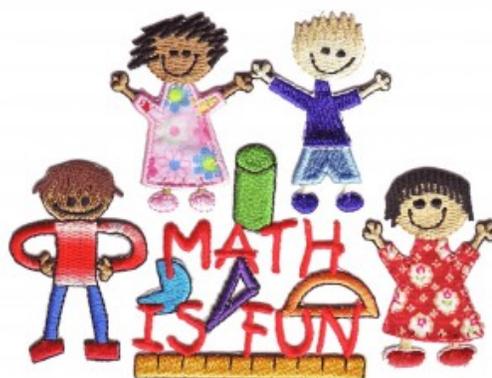
Included in this guide is an overview of the Common Core Learning Standards for Kindergarten, a glossary compiled by Michele Gipe, West Genesee Math Coach, that contains many of the newer terms to which students are being exposed, information from “A Parent’s Backpack Guide to the Common Core” from EngageNY, a sampling of strategies that students use in kindergarten for various concepts from a variety of sources, information from “Parent Roadmap: Supporting Your Child in Kindergarten Mathematics,” and websites for both parents and students.

We will continue to update and revise these guides as we continue along our journey in the implementation of the Common Core. If you have any suggestions for things to include in this guide, please send an email to lcraig@westgenesee.org. I hope you find this guide helpful. Thank you!

Lisa Craig
East Hill Elementary Principal
Elementary Math Coordinator

Table of Contents

Kindergarten Common Core Learning Standards Overview.....	p. 2
Parent’s Backpack Guide to the Common Core State Standards for Mathematics	p. 3
Parent Roadmap: Supporting Your Child in Kindergarten Mathematics.....	p. 4 - 5
Kindergarten Glossary compiled by Michele Gipe, West Genesee Math Coach	p. 6 - 7
Kindergarten Strategies from the KATM Flip Book for Kindergarten	p. 7 - 8
Stages of Addition (adapted from <i>Why Before How</i>)	p. 10
Stages of Subtraction (adapted from <i>Why Before How</i>)	p. 11
Websites for Kindergarteners and their Families	p. 12-13
Resources Used	p. 14



The way we taught students in the past simply does not prepare them for the higher demands of college and careers today and in the future. Your school and schools throughout the country are working to improve teaching and learning to ensure that all children will graduate high school with the skills they need to be successful.

In mathematics, this means three major changes. Teachers will concentrate on teaching a more focused set of major math concepts and skills. This will allow students time to master important ideas and skills in a more organized way throughout the year and from one grade to the next. It will also call for teachers to use rich and challenging math content and to engage students in solving real-world problems in order to inspire greater interest in mathematics.

Taken from Parent Roadmap: Supporting Your Child in Kindergarten Mathematics

An Overview of Kindergarten Math

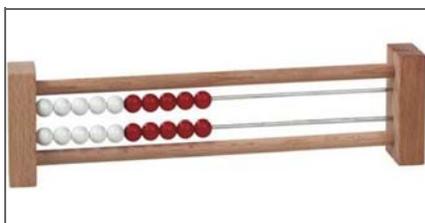
In Kindergarten, instructional time should focus on two critical areas: (1) representing and comparing whole numbers, initially with sets of objects; (2) describing shapes and space. More learning time in Kindergarten should be devoted to number than to other topics.

1. Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects; comparing sets or numerals; and modeling simple joining and separating situations with sets of objects, or eventually with equations such as $5 + 2 = 7$ and $7 - 2 = 5$. (Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required.) Students 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 two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (e.g., with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders, and spheres. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

Mathematical Practices

These eight practices are the goals of all math education, K-12

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.



Big Ideas in Kindergarten

Counting and Cardinality

- Know number names and the count sequence.
- Count to tell the number of objects.
- Compare numbers.

Operations and Algebraic Thinking

- Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

Number and Operations in Base Ten

- Work with numbers 11–19 to gain foundations for place value.

Measurement and Data

- Describe and compare measurable attributes.
- Classify objects and count the number of objects in categories.

Geometry

- Identify and describe shapes.
- Analyze, compare, create, and compose shapes.

What is Changing in Mathematics Education

The information below was taken from the "Parent's Backpack Guide to Common Core State Standards" found on engageny.org.

To improve student learning, the new Common Core State Standards are different from the old ones. These changes are called shifts. The chart below shows what is shifting, what you might see in your child's backpack and what you can do to help your child. Again, if your child's assignments do not reflect the shifts, then talk to your child's teacher.

What's Shifting?	What to Look for in the Backpack?	What Can You Do?
<ul style="list-style-type: none"> • Your child will <u>work more deeply in fewer topics</u>, which will ensure full understanding. (less is more!) 	<ul style="list-style-type: none"> • Look for assignments that require students to show their work and explain how they arrived at an answer. 	<ul style="list-style-type: none"> • Know what concepts are important for your child based on their grade level and spend time working on those concepts.
<ul style="list-style-type: none"> • Your child will <u>keep building on learning year after year</u>, starting with a strong foundation. 	<ul style="list-style-type: none"> • Look for assignments that build on one another. For example, students will focus on adding, subtracting, multiplying and dividing. Once these areas are mastered, they will focus on fractions. Building on that, they will then focus on Algebra. You should be able to see the progression in the topics they learn. 	<ul style="list-style-type: none"> • Be aware of what concepts your child struggled with last year and support your child in those challenge areas moving forward.
<ul style="list-style-type: none"> • Your child will <u>spend time practicing and memorizing math facts</u>. 	<ul style="list-style-type: none"> • Look for assignments that ask your child to master math facts such as addition groupings up to 20 or multiplication tables. 	<ul style="list-style-type: none"> • Help your child know and memorize basic math facts. Ask your child to "do the math" that pops up in daily life.
<ul style="list-style-type: none"> • Your child will <u>understand why the math works and be asked to talk about and prove their understanding</u>. 	<ul style="list-style-type: none"> • Your child might have assignments that ask her or him to show or explain their mathematical thinking - to SAY why they think their answer is the right one. 	<ul style="list-style-type: none"> • Talk to your child about their math homework and ask them to teach you new concepts. Help them figure out ways to explain their thinking.
<ul style="list-style-type: none"> • Your child will now be asked to <u>use math in real-world situations</u>. 	<ul style="list-style-type: none"> • Look for math assignments that are based on the real world. For instance, homework for 5th graders might include adding fractions as part of a dessert recipe or determining how much pizza friends ate based on fractions. 	<ul style="list-style-type: none"> • Provide time every day for your child to work on math at home.

How Kindergarten “Fits” in the Progression

(taken from Parent Roadmap: Supporting Your Child in Kindergarten Mathematics)

In kindergarten, your child will focus primarily on two important areas. The first is learning numbers and what numbers represent. The second is addition and subtraction. Students will also learn to identify and work with shapes. Activities in these areas include: counting how many objects are in a group and comparing the quantities of two groups of objects, comparing two numbers to identify which is greater or less than the other, understanding addition as putting together and subtraction as taking away from, adding and subtracting very small numbers quickly and accurately, breaking up numbers less than or equal to 10 in more than one way (for example, $9=6+3$, $9=5+4$), for any number from 1 to 9, finding the missing quantity that is needed to reach 10, representing addition and subtraction word problems using objects or by drawing pictures, and solving addition and subtraction word problems involving numbers that add up to 10 or less or by subtracting from a number 10 or less.



Here are just a few examples of the skills and strategies students will develop as they solve word problems in kindergarten.

Kindergarten Mathematics	Grade One Mathematics	Grade Two Mathematics
<ul style="list-style-type: none"> • Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (such as claps), acting out situations, verbal explanations, expressions, and equations • Solve word problems by adding or subtracting numbers up through 10 using objects and drawings 	<ul style="list-style-type: none"> • Solve word problems by adding or subtracting numbers up through 20 • Solve addition and subtraction problems for different unknown numbers ($20-?=15$, $9+4=?$) 	<ul style="list-style-type: none"> • Solve one- and two-step word problems by adding or subtracting numbers up through 100

Examples of Kindergarten Word Problems

 Addition	Three red apples and three green apples are on the table. How many apples are on the table?
 Subtraction	Mom has ten apples. She gives one to Mary Ann. How many apples are left?

In kindergarten your child will use a variety of pictures and models to understand and solve addition and subtraction problems.



Partnering with your Child's Teacher

(taken from Parent Roadmap)

Don't be afraid to reach out to your child's teacher—you are an important part of your child's education. Ask to see a sample of your child's work or bring a sample with you. Ask the teacher questions like:

- Is my child at the level where he/she should be at this point of the school year?
- Where is my child excelling? How can I support this success?
- What do you think is giving my child the most trouble? How can I help my child improve in this area?
- What can I do to help my child with upcoming work?

Here are just a few examples of how students will work with numbers and learn to think of ten as a unit—important building blocks for understanding place value.

Kindergarten Mathematics

- Count to 100 by ones and tens
- Understand that numbers from 11 to 19 contain a ten and some leftover ones (for example, $14=10+4$)

Grade One Mathematics

- Understand that 10 can be thought of as a bundle of ten ones—called a "ten"
- Understand that the two digits of a two-digit number represent amounts of tens and ones (place value)
- Add and subtract numbers through 100 using what students have learned about place value

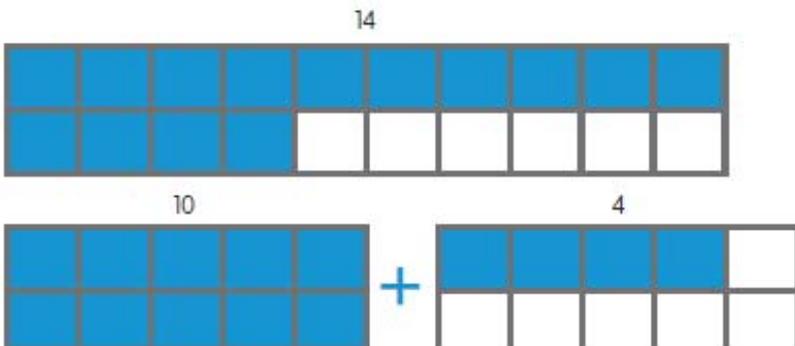
Grade Two Mathematics

- Understand that 100 can be thought of as a bundle of ten tens—called a "hundred"
- Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones (place value)
- Add and subtract numbers through 1000 using what students have learned about place value

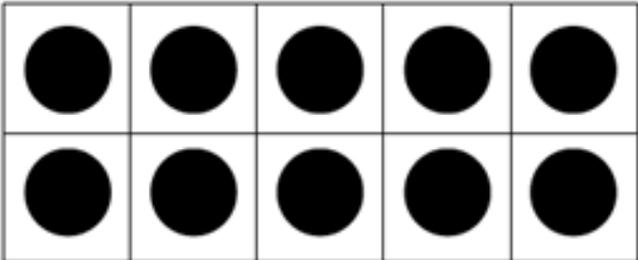
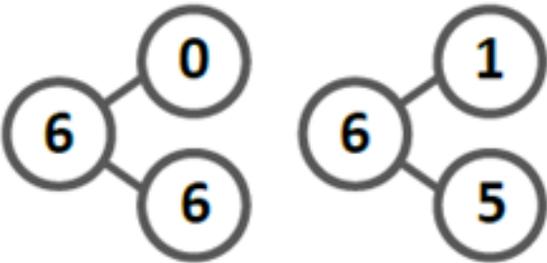
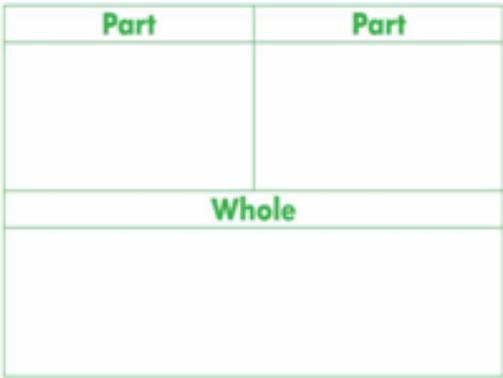
Your child will learn to find the "partners" that make ten for any number. This drawing shows that if you have 8, it takes 2 more to make 10.



From there, students learn to think of ten as a unit and to break all the teen numbers down to a ten and some leftover ones.



Glossary for Kindergarten Math

Term	Description	Visual Representation
Tens Frame	A 2x5 grid used for combinations to 10 and adding and subtracting within 20	
Number Bond	<p>A representation of two smaller parts that make up a whole.</p> <p>For example, 6 is made up of 0 and 6 or 6 is made up of 1 and 5</p>	
Number Path	<p>Foundation for understanding a number line – 1 number, 1 space</p> <p>Counting and matching numbers and objects</p>	
Part-Part Total Part- Part Whole	<p>A way to show the two smaller parts that make up a whole (similar to a number bond, different visual representation)</p>	

Glossary for Kindergarten Math, cont.

Say 10 Counting	A way to count that separates the tens and ones	Ten-one, Ten-two, Ten-three, Ten-four, etc...	
		Regular	Unit Form
		eleven	1 ten one
		twelve	1 ten two
		thirteen	1 ten three
		twenty	2 tens
		twenty-six	2 tens six

Kindergarten Math Strategies (taken from KATM Flip Book for Kindergarten)

Counting and Cardinality:

Counting should be reinforced throughout the day, not in isolation. (Meaningful Counting)

Examples:

- Count the number of chairs of the students who are absent
- Count the number of stairs, shoes, etc.
- Counting groups of ten such as —fingers in the classroom (ten fingers per student).
- Count the number of students in a group.
- Count the number of specific object they have in their desk (e.g. crayons)

When counting orally, students should recognize the patterns that exist from 1 to 100. They should also recognize the patterns that exist when counting by 10s. Have students verbalize the patterns they see.

Accurate in counting depends on three things:

1. Knowing the patterns in the number-word list so that a correct number-word list can be said
2. Correctly assigning one number word to one object (one-to one-correspondence)
3. Keeping track of which objects have already been counted so that they are not counted more than once.

Kindergarten Math Strategies, cont. (taken from KATM Flip Book for Kindergarten)

Students should be given multiple opportunities to count objects and recognize that a number represents a specific quantity. Once this is established, students begin to read and write numerals (numerals are the symbols for the quantities). The emphasis should first be on quantity and then connecting quantities to the written symbols.

- A sample unit sequence might include:
 1. Counting up to 20 objects in many settings and situations over several weeks.
 2. Beginning to recognize, identify, and read the written numerals, and match the numerals to given sets of objects.
 3. Writing the numerals to represent counted objects.
- Since the teen numbers are not written as they are said, teaching the teen numbers as one group of ten and extra ones is foundational to understanding both the concept and the symbol that represents each teen number. For example, when focusing on the number “14,” students should count out fourteen objects using one-to-one correspondence and then use those objects to make one group of ten and four extra ones. Students should connect the representation to the symbol “14.”

Students should develop counting strategies to help them organize the counting process to avoid re-counting or skipping objects.

Examples:

- If items are placed in a circle, the student may mark or identify the starting object.
- If items are in a scattered configuration, the student may move the objects into an organized pattern.
- Some students may choose to use grouping strategies such as placing objects in twos, fives, or tens (note: this is not a kindergarten expectation).

Counting up to 20 objects should be reinforced when collecting data to create charts and graphs.

Students should develop a strong sense of the relationship between quantities and numerals before they begin comparing numbers.

Other strategies:

- **Matching:** Students use one-to-one correspondence, repeatedly matching one object from one set with one object from the other set to determine which set has more objects.
- **Counting:** Students count the objects in each set, and then identify which set has more, less, or an equal number of objects.
- **Observation:** Students may use observation to compare two quantities (e.g., by looking at two sets of objects, they may be able to tell which set has more or less without counting).
- **Observations in comparing two quantities** can be accomplished through daily routines of collecting and organizing data in displays. Students create object graphs and pictographs using data relevant to their lives (e.g., favorite ice cream, eye color, pets, etc.). Graphs may be constructed by groups of students as well as by individual students.
- **Benchmark Numbers:** This would be the appropriate time to introduce the use of 0, 5 and 10 as benchmark numbers to help students further develop their sense of quantity as well as their ability to compare numbers.

Students state whether the number of objects in a set is more, less, or equal to a set that has 0, 5, or 10 objects.

Operations and Algebraic Thinking

Instructional Strategies: Using addition and subtraction in a word problem context allows students to develop their understanding of what it means to add and subtract. Students should use objects, fingers, mental images, drawing, sounds, acting out situations and verbal explanations in order to develop the concepts of addition and subtraction. Then, they should be introduced to writing expressions and equations using appropriate terminology and symbols which include $+$, $-$, and $=$.

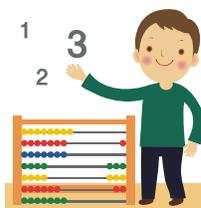
- Addition terminology: *add, join, put together, plus, combine, total*
- Subtraction terminology: *minus, take away, separate, difference, compare*

Have students decompose numbers less than or equal to 5 during a variety of experiences to promote their fluency with sums and differences less than or equal to 5 that result from using the numbers 0 to 5. For example, ask students to use different models to decompose 5 and record their work with drawings or equations. Next, have students decompose 6, 7, 8, 9, and 10 in a similar fashion. As students begin to understand the role and meaning of arithmetic operations in number systems, they will gain computational fluency, and using efficient and accurate methods for computing.

Students should be encouraged to use create drawings /pictorial representations of the problems and/or situation. **If students progress from working with manipulatives to writing numerical expressions and equations, and they skip using pictorial thinking—students will then be more likely to use finger counting and rote memorization for work with addition and subtraction.**

Counting forward builds to the concept of addition while counting back leads to the concept of subtraction. However, counting is an inefficient strategy. Teachers need to provide instructional experiences so that students progress from the concrete level, to the pictorial level, then to the abstract level when learning mathematical concepts. **(Concrete, Representational, Abstract CRA)**

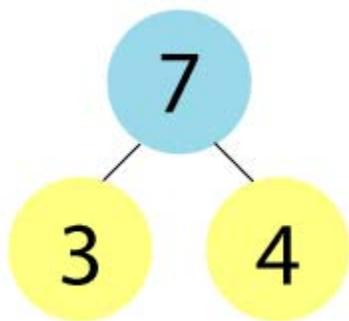
Just knowing the basic facts is not enough. We need to help students develop the ability to quickly and accurately understand the **relationships** between numbers. They need to make sense of numbers as they find and make strategies for joining and separating quantities.



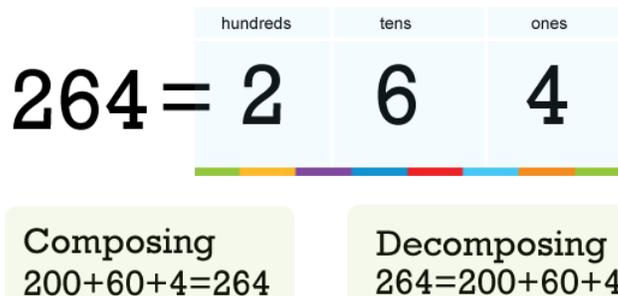
Addition Stages (adapted from *Why Before How*)

It is important to encourage your students to use a variety of computation strategies. Guide your students to notice what is the same and different about these methods. Begin with the concrete, move on to pictorial representations, and end with the abstract. You can do this by teaching the concept of addition in the following sequence: 1) Number bonds, 2) Decomposing numbers, 3) Left-to-right addition, 4) Place value disks and charts, 5) Vertical addition, and 6) Traditional addition.

Number Bonds help students see that numbers can be “broken” into pieces to make computation easier.



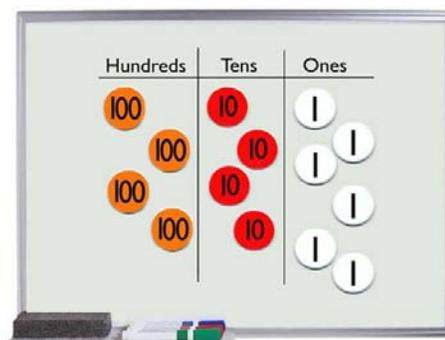
Decomposing Numbers encourages students to think about place value, and students’ awareness of place value will be key to later success with mental math and other computation methods.



Left-to-Right Addition emphasizes place value. Decomposing is an important prerequisite.

$$\begin{array}{r}
 34 + 45 \\
 (30 + 40) + (4 + 5) \\
 70 + 9
 \end{array}$$

Place Value Disks and Charts help move students toward understanding the traditional algorithm, and help students understand when to regroup.



Vertical Addition is similar to left-to-right, except that it is vertical instead of horizontal. This is also known as partial sums.

$$\begin{array}{r}
 59 \\
 +37 \\
 \hline
 80 \\
 16 \\
 \hline
 96
 \end{array}$$

Traditional Addition is the final addition strategy that students learn. It is important that it is connected to other methods when it is taught.

$$\begin{array}{r}
 ^1 59 \\
 +37 \\
 \hline
 96
 \end{array}$$

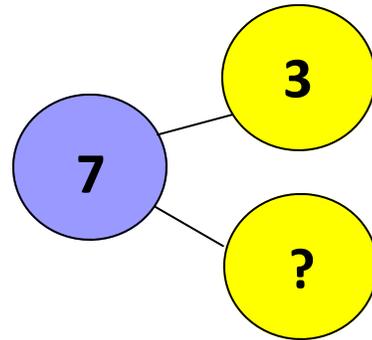
Subtraction Stages (adapted from *Why Before How* and *Foundations of Number Sense*)

It is important to help our students understand the concept of subtraction first, before bombarding them with abstract rules. Students can build an understanding of subtraction by sharing stories in which they have subtracted. They need to begin with the concrete, move on to pictorial representations, and then move to the abstract. You can do this by teaching number bonds, then moving to place value disks and charts, partial differences, traditional subtraction, and compensation strategies.

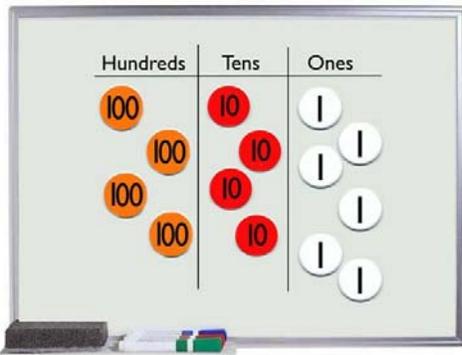
Pictorial Representations help students see that subtraction involves taking away.



Number Bonds help students see that numbers can be “broken” into pieces to make computation easier.

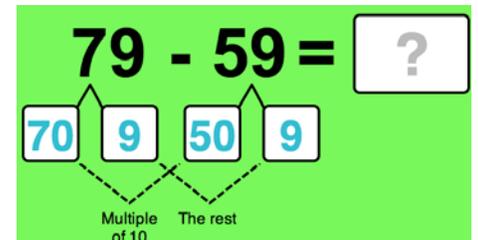


Place Value Disks and Charts help move students toward understanding the traditional algorithm, and help students understand when to regroup.



Partial Differences reinforces place value. Students can be taught to subtract the tens place first, or the ones place.

$$\begin{array}{r} 52 \\ - 37 \\ \hline 50 \\ - 30 \\ \hline 20 \\ - 5 \\ \hline 15 \end{array}$$



Traditional Subtraction is the final addition strategy that students learn. It is important that it is connected to other methods when it is taught.

$$\begin{array}{r} 41 \\ \cancel{5}2 \\ - 37 \\ \hline 15 \end{array}$$

Compensation involves adding or subtracting the same number to the minuend as the subtrahend, making it easier to solve.

$$\begin{array}{r} 52 + 2 = 54 \\ - 28 + 2 \quad - 30 \\ \hline 24 \end{array}$$

Teacher Recommended Free Apps for Kindergarteners:

10 Frame Fill

Concentration

Number Lines

Math Word Problems – Addition and Subtraction for Kindergarten and First Grade

My Math Book

My First Tangrams HD (LITE)

Number Rack

Teacher Recommended Apps for Kindergarteners (that cost a little \$):

iMath 10 Maker (\$0.99)

Math Workout and Exercise (\$0.99)

Skip Counting, HAVOC (\$0.99)

Missing Numbers (\$1.99)

ArithmeticRek (\$0.99)

Monkey Math (\$1.99)

Bugs and Buttons (\$2.99)

My First Tangrams (\$1.99)

Hungry Fish (\$1.99)

Montessori Sequencing (\$3.99)

Simple Counting (\$1.99)

www.softschools.com

http://www.eduplace.com/kids/mw/help/eh_k.html

Websites for Kindergarteners:

www.ABCya.com

Websites for Kindergarten Families:

www.engageny.org

Central Square Video Library, <http://www.cssd.org/parent.cfm?subpage=50469>, click on the grade level you are interested under “Elementary Math Resources” on the left

Jamesville-DeWitt Math Resources, <http://www.jamesvilledewitt.org/teacherpage.cfm?teacher=1079>

Youtube clips:

Macarena Months:

<http://www.youtube.com/watch?v=ITTrIGx-Ctk>

Counting to 100:

<http://www.youtube.com/watch?v=iGKXZVxAffM>

<http://www.youtube.com/watch?v=e0dJWfQHF8Y>

Number Formation:

<http://www.youtube.com/watch?v=SXym-UG3esY>

Counting Songs:

<http://www.youtube.com/watch?v=REAXGhFJcXQ>

<http://www.youtube.com/watch?v=v4sWyckBaOM>

http://www.youtube.com/watch?v=srPktd4k_O8

<http://www.youtube.com/watch?v=NUHFzH06HqU>

Months:

<http://www.youtube.com/watch?v=REAXGhFJcXQ>

Resources Used in this Publication

EngageNY, www.engageny.org

Math with Meaning: Foundations of Number Sense, Staff Development for Educators, 2011

Kansas Association of Teachers of Mathematics (KATM) Flip Books, www.katm.org

New York State Education Department, Common Core Learning Standards for Mathematics, K-12

Parent Roadmap: Supporting Your Child in Kindergarten Mathematics, Council of the Great City Schools, Washington, D.C.; <http://www.cgcs.org>

Why Before How: Singapore Math Computation Strategies, Jana Hazenkamp, 2011