

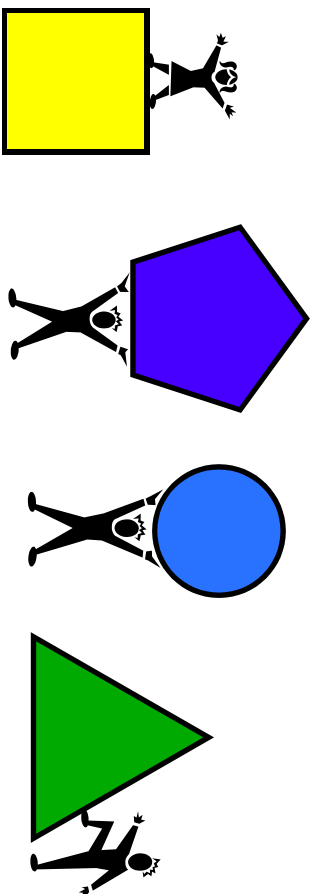
# Mathematics

## Curriculum

### Grade Kindergarten



Grade K Mathematics



Approved by Instructional Council on March 27, 2013

**Overview:**

This curriculum is aligned to the Common Core State Standards for Mathematics.

Standards are coded (see below). For each standard, or cluster of standards, activities are listed that are specific to those standards. Extensions, technology and other support materials (including those found in the teachers' manuals) are listed to help with differentiation of math instruction.

**Standards for Mathematical Practice:** The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. The Mathematical Practices should be used when planning lessons. (See Appendix A for a full description of each standard with explanations and examples for your grade level.)

**Standards for Mathematical Content:** Examples and Explanations of each content standard can be found within this document. These examples were adapted from a document titled *MATHEMATICS: Arizona Academic Content Standards*.

**Glossary of Terms:** key terms needed to understand the units of study can be found in Appendix A.

**Vocabulary:**

A list of important mathematical vocabulary can be found at the end of each unit. Students need to become fluent with vocabulary so that they can communicate effectively in mathematics. It is suggested that math vocabulary be posted for each unit, and that students have opportunities to “define” terms using words, numbers, pictures, examples and by making connections to their lives or other areas of mathematics.

**Pacing Guide:** Refer to the pacing guide for a sequence of units of study.

**21<sup>st</sup> Century Skills:** skills needed to be prepared for 21<sup>st</sup> century life, work and citizenship. An overview of these skills and Outcomes for 21<sup>st</sup> Century Skills in Math can be found in Appendix A.

**Key to Coding:**

**Standards** define what students should understand and be able to do.

**Clusters** are groups of related standards. Note that standards from different clusters may sometimes be closely related, because mathematics is a connected subject.

**Domains** are larger groups of related standards. Standards from different domains may sometimes be closely related.

**Example:**

CC.K.NBT.1 refers to Common Core, Kindergarten, Number and Operations in Base 10, standard 1.

Domain and clusters for Kindergarten can be found on the next page. Standards are listed in the text of the curriculum.

# Common Core State Standards for Mathematics

## Kindergarten

Domains	Counting and Cardinality	Operations and Algebraic Thinking	Number and Operations in Base Ten	Measurement and Data	Geometry
Clusters	<ul style="list-style-type: none"> <li>Know number names and the count sequence</li> <li>Counting to tell the number of objects</li> <li>Compare numbers</li> </ul>	<ul style="list-style-type: none"> <li>Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from</li> </ul>	<ul style="list-style-type: none"> <li>Work with numbers 11 – 19 to gain foundations for place value</li> </ul>	<ul style="list-style-type: none"> <li>Describe and compare measurable attributes</li> <li>Classify objects and count the number of objects in each category</li> </ul>	<ul style="list-style-type: none"> <li>Identify and describe shapes</li> <li>Analyze, compare, create and compose shapes</li> </ul>
Mathematical Practices	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.	

In Kindergarten, instructional time should focus on two critical areas:

### 1. *Representing and comparing whole numbers, initially with sets of objects*

- 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. *Describing shapes and space*

- 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.

More learning time in Kindergarten should be devoted to number than to other topic.



## Grade K Mathematics

Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>The student will count to tell the number of objects.</b></p> <p><b>CC.K.CC.4 UNDERSTAND the relationship between numbers and quantities: CONNECT counting to cardinality.</b></p> <p><b>CC.K.CC.4a When counting objects, SAY the number names in the standard order, PAIRING each object with one and only one number name and each number name with one and only one object.</b></p> <p><b>CC.K.CC.4b UNDERSTAND that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.</b></p> <p><b>CC.K.CC.4c UNDERSTAND that each successive number name refers to a quantity that is one larger.</b></p> <p>CC.K.CC.5 COUNT to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle; or as many as 10 things in a scattered configuration; given a number from 1-20, COUNT OUT that many objects.</p>	<p>K.CC.4. This standard focuses on one-to-one correspondence and how cardinality connects with quantity.</p> <ul style="list-style-type: none"> <li>For example, when counting three bears, the student should use the counting sequence, "1-2-3," to count the bears and recognize that "three" represents the group of bears, not just the third bear. A student may use an interactive whiteboard to count objects, cluster the objects, and state, "This is three". (Cardinality tells "how many".)</li> </ul> <p>In order to understand that each successive number name refers to a quantity that is one larger, students should have experience counting objects, placing one more object in the group at a time.</p> <ul style="list-style-type: none"> <li>For example, using cubes, the student should count the existing group, and then place another cube in the set. Some students may need to re-count from one, but the goal is that they would count on from the existing number of cubes. S/he should continue placing one more cube at a time and identify the total number in order to see that the counting sequence results in a quantity that is one larger each time one more cube is placed in the group.</li> <li>A student may use a clicker (electronic response system) to communicate his/her count to the teacher.</li> </ul> <p>K.CC.5. Students should develop counting strategies to help them organize the counting process to avoid re-counting or skipping objects.</p> <p>Examples:</p> <ul style="list-style-type: none"> <li>If items are placed in a circle, the student may mark or identify the starting object.</li> <li>If items are in a scattered configuration, the student may move the objects into an organized pattern.</li> <li>Some students may choose to use grouping strategies such as placing objects in twos, fives, or tens (note: this is not a kindergarten expectation).</li> <li>Counting up to 20 objects should be reinforced when collecting data to create charts and graphs.</li> <li>A student may use a clicker (electronic response system) to communicate his/her count to the teacher.</li> </ul>



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Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Number	COUNT (objects)	1
Relationships (zero to 20)	SAY numbers (in order)	2
<ul style="list-style-type: none"> <li>• Number and quantity</li> </ul>	PAIR (each object with one number)	3
<ul style="list-style-type: none"> <li>• Counting and cardinality</li> </ul>	UNDERSTAND <ul style="list-style-type: none"> <li>• (last number name tells objects counted)</li> <li>• (number of objects is the same regardless of arrangement)</li> <li>• (number of objects is the same regardless of order)</li> <li>• (each successive number refers to a quantity that is one larger)</li> </ul>	3
<ul style="list-style-type: none"> <li>• Number names in standard order</li> </ul>	IDENTIFY/COMPARE groups of objects	1, 2
<ul style="list-style-type: none"> <li>• Number comparisons (zero to 10)               <ul style="list-style-type: none"> <li>○ Greater than</li> <li>○ Less than</li> <li>○ Equal to</li> </ul> </li> </ul>	WRITE (numbers zero to twenty)	1
Written numerals zero to twenty	REPRESENT (number of objects with written numeral)	3
	COMPARE (two numbers between 1 and 10)	2
	CLASSIFY (objects into categories)	2
	COUNT (number of objects in a category)	1
	SORT (categories by count)	3

## Grade K Mathematics

Essential Questions	Big Ideas
Why do we count?	Counting tells how many there are in a group regardless of their arrangement. The last number said when counting tells the total number of objects counted.
How are numerals used?	Numerals are the symbols we read and write to communicate quantities (numbers).
How can two amounts be compared?	One quantity is either greater than, less than or equal to other.

Mathematical Practices UNIT 1
<p><i>Practices in bold are to be emphasized in the unit.</i></p> <ol style="list-style-type: none"> <li><b>1. Make sense of problems and persevere in solving them.</b></li> <li><b>2. Reason abstractly and quantitatively.</b></li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li><b>4. Model with mathematics.</b></li> <li>5. Use appropriate tools strategically.</li> <li><b>6. Attend to precision.</b></li> <li><b>7. Look for and make use of structure.</b></li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>

### Learning Activities:

#### Teacher notes:

- The standards require students to work with numbers 0-20. However, since much number work is done during calendar time, students should explore working with numbers to 30.
- During this unit, have available collections of objects to count, hundred charts, number lines and calendars. (Add three ten-frames to calendar activities. Stamp, sticker, or color one section each day (up to 30). Also, add a number line 1-30 to calendar activities. These will show multiple ways of representing numbers with tens and ones, in addition to your bundles of straws.)
- See Unit 1 Appendix for research on content and pedagogy regarding *Early Number and Numeration*.

1. Students identify objects that are alike or different. MC 1-1

2. Students sort by one attribute. MC 1-2

#### *Alternate activities:*

- Encourage children to classify objects in the classroom such as old crayons or pencils by characteristics, e.g., color, length, and points or no points.
- Have children find all of the objects in the room that have a common attribute or use, such as all smooth objects or everything that can be used to make a picture.



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3. Students sort by more than one attribute. MC 1-4

4. Students use one-to-one correspondence to show groups that are the same, groups with more and groups with less MC 1-5, 1-6, 1-7

5. Using concrete objects, students name recognize, count and write numerals 1, 2, 3, 4, 5. MC 2-1, 2-2, 2-3, 2-4

**Teacher note:** use ten frames to build numbers.

*Additional Activities:* *Talking About Numbers* (Marilyn Burns) see Unit 1 Appendix: conversations about numbers to encourage children to think and talk about numbers in a way that makes sense to them.

6. Students recognize and write the numeral 0. MC 2-6

7. Students use one-to-one correspondence to compare and order numbers to 5. MC 2-7, 2-8

*Additional activities:*

- Have children arrange sets of different amounts of objects in one-to-one correspondence. Ask questions such as:
  1. Which group has more?
  2. Which group has less?
  3. Do these have the same amount? How do you know?
- Make a group of objects. Have the children count and create a group that is the same as the given group. Make another group that has more or less than the original group. Describe how your group is different from the original group. Ask questions such as:
  1. Is your group a lot more or a lot less? A little more? A little less?
  2. Can you tell how many more are in this group? How do you know?
  3. Can you match the number of objects in a set to the number names?
  4. What number comes after \_\_\_\_\_? Before \_\_\_\_\_?

8. Using concrete objects, students name, recognize, count and write numerals 6, 7, 8, 9, 10 MC 4-1, 4-2, 4-3, 4-4, 4-5

**Teacher notes:**

- Have students count on from a given number (other than starting at 1)
- When counting by ones, students need to understand that the next number in the sequence is one more. When counting by tens, the next number in the sequence is “ten more” (or one more group of ten).

9. Students compare and order numbers to 10. MC 4-7, 4-8

10. (Introduce) Students use ordinal numbers to describe position. MC 4-9

*Alternate activities:*

- When children are in line, have a child chose who is first in line. Ask the child (the line leader) to identify the child who is second in line. Repeat this process for the children who are third through fifth and last in line.
- Using familiar objects or a series of pictures of familiar objects ask the children to identify which object is first, second, third, fourth or last.

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**VOCABULARY:** alike, count, different, equal, less than, more than, number, order, same number, sort, zero through twenty

For illustrated vocabulary cards:

<http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Documents/Vocabulary%20Documents/Vocabulary%20Cards%20Kindergarten.pdf>

### **Problem-solving strategies:**

Act it Out            MC 1-3  
Draw a Picture      MC 2-5  
Draw a Picture      MC 4-6

Content to be assessed on **Fall Assessment**

**Instructional Strategies:** See Appendix A for research-based Instructional and Differentiated Strategies

**21<sup>st</sup> Century Learning Skills:** See Appendix A for explanations.

### **Differentiated Instruction:**

Refer to suggestions and leveled lesson resources at the beginning of each lesson in *Math Connects*.

### **Technology and Electronic Resources:**

*SuccessMaker*

*Math Connects* online learning center for tools, activities and “learn more” experiences.

- Gayle’s Preschool Rainbow <http://www.preschoolrainbow.org/counting-theme.htm> Early childhood education ideas and activities that encourage counting, observation and listening skills.
- More Counting: <http://math.rice.edu/~lanius/counting/index2.html> Colorful, interactive set of counting activities.
- Let’s Count to 5: <http://illuminations.nctm.org/LessonDetail.aspx?id=U57> In this unit, students make groups of zero through five objects and connect number words to the groups. They use numerals to record the size of a group.
- Building numbers to 10: <http://illuminations.nctm.org/LessonDetail.aspx?id=U147> In this unit, students make groups of zero to 10 objects, connect number names to the groups, compose and decompose numbers, and use numerals to record the size of a group.
- Understanding a Child’s Development of Number Sense: [http://illuminations.nctm.org/Reflections\\_preK-2.html](http://illuminations.nctm.org/Reflections_preK-2.html) (text and video)

### **Interdisciplinary Connections:**

See suggestions for Cross-Curricular links with art, social studies, health, science, language arts, music, technology and reading, at the beginning of each unit in the *Math Connects* Teacher’s Manual.



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Priority and Supporting Common Core State Standards	Explanation and Examples
<p>CC.K.G.3 IDENTIFY shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").</p> <p style="background-color: yellow;">The student will analyze, compare, create and compose shapes.</p> <p><b>CC.K.G.4 ANALYZE and COMPARE a variety of two- and three-dimensional shapes, in different sizes and orientations, using informal language to DESCRIBE their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).</b></p> <p><b>CC.K.G.5 MODEL shapes in the world by BUILDING shapes (3D) from components (e.g., sticks and clay balls) and DRAWing shapes (2D)</b></p> <p>CC.K.G.6 COMPOSE simple shapes to form larger shapes. <i>For example, "Can you join these two triangles with full sides touching to make a rectangle?"</i></p>	<p>K.G.3. Student should be able to differentiate between two dimensional and three dimensional shapes.</p> <ul style="list-style-type: none"> <li>• Student names a picture of a shape as two dimensional because it is flat and can be measured in only two ways (length and width).</li> <li>• Student names an object as three dimensional because it is not flat (it is a solid object/shape) and can be measured in three different ways (length, width, height/depth).</li> </ul> <p>K.G.4. Students analyze and compare two- and three-dimensional shapes by observations. Their visual thinking enables them to determine if things are alike or different based on the appearance of the shape. Students sort objects based on appearance. Even in early explorations of geometric properties, they are introduced to how categories of shapes are subsumed within other categories. For instance, they will recognize that a square is a special type of rectangle.</p> <p>Students should be exposed to triangles, rectangles, and hexagons whose sides are not all congruent. They first begin to describe these shapes using everyday language and then refine their vocabulary to include sides and vertices/corners. Opportunities to work with pictorial representations, concrete objects, as well as technology helps student develop their understanding and descriptive vocabulary for both two- and three- dimensional shapes.</p> <p>K.G.5. Because two-dimensional shapes are flat and three-dimensional shapes are solid, students should draw two-dimensional shapes and build three-dimensional shapes. Shapes may be built using materials such as clay, toothpicks, marshmallows, gumdrops, straws, etc.</p> <p>K.G.6. Students use pattern blocks, tiles, or paper shapes and technology to make new two- and three-dimensional shapes. Their investigations allow them to determine what kinds of shapes they can join to create new shapes. They answer questions such as "What shapes can you use to make a square, rectangle, circle, triangle? ...etc."</p> <p>Students may use a document camera to display shapes they have composed from other shapes. They may also use an interactive whiteboard to copy shapes and compose new shapes. They should describe and name the new shape</p>

## Grade K Mathematics

Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>The student will describe and compare measurable attributes.</b>  <b>CC.K.MD.2</b> Directly <b>COMPARE</b> two objects with a measurable attribute in common, to see which object has “more of/less of” the attribute, and <b>DESCRIBE</b> the difference.</p> <p><b>The student will classify objects and count the number of objects in each category.</b>  <b>CC.MD.3</b> CLASSIFY objects into given categories; COUNT the numbers of objects in each category and SORT the categories by count.</p>	<p>K.MD.2. When making direct comparisons for length, students must attend to the “starting point” of each object. For example, the ends need to be lined up at the same point, or students need to compensate when the starting points are not lined up (conservation of length includes understanding that if an object is moved, its length does not change; an important concept when comparing the lengths of two objects).                      Language plays an important role in this standard as students describe the similarities and differences of measurable attributes of objects (e.g., shorter than, taller than, lighter than, the same as, etc.).</p> <p>K.MD.3. Possible objects to sort include buttons, shells, shapes, beans, etc. After sorting and counting, it is important for students to:</p> <ul style="list-style-type: none"> <li>• explain how they sorted the objects;</li> <li>• label each set with a category;</li> <li>• answer a variety of counting questions that ask, “How many...”, and compare sorted groups using words such as “most”, “least”, “alike”, and “different”.</li> </ul>

## Grade K Mathematics

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Shapes	DESCRIBE (objects in the environment)	2
Relative positions	USE	4
Two- and three-dimensional shapes	<ul style="list-style-type: none"> <li>• (names of shapes, regardless of orientation)</li> <li>• (positions)</li> </ul>	
<ul style="list-style-type: none"> <li>• Similarities</li> <li>• Differences</li> <li>• Parts</li> <li>• Attributes</li> </ul>	IDENTIFY (two- and three-dimensional shapes)	1
	ANALYZE (two- and three-dimensional shapes)	4
	COMPARE (two- and three-dimensional shapes)	2
	DESCRIBE (similarities and differences, parts, and other attributes)	1
	MODEL (shapes in world)	6
	BUILD (shapes)	6
	COMPOSE (simple shapes from larger shapes)	6
	COMPARE (attribute of 2 objects)	2
	DESCRIBE (which has more/less of attribute)	1
	DRAW (shapes 2D)	3
	CLASSIFY (objects into categories)	2
	COUNT (number of shapes in each category)	1
	SORT (categories by count)	2

## Grade K Mathematics

Essential Questions	Big Ideas
How can I make new shapes from other shapes?	Polygons can be constructed from other polygons.
Does a shape change if you move it around?	The orientation of an object does not change the other attributes of the object.

Mathematical Practices UNIT 2
<p><i>Practices in bold are to be emphasized in the unit.</i></p> <ol style="list-style-type: none"> <li><b>1. Make sense of problems and persevere in solving them.</b></li> <li><b>2. Reason abstractly and quantitatively.</b></li> <li><b>3. Construct viable arguments and critique the reasoning of others.</b></li> <li><b>4. Model with mathematics.</b></li> <li>5. Use appropriate tools strategically.</li> <li><b>6. Attend to precision.</b></li> <li><b>7. Look for and make use of structure.</b></li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>

### Learning Activities:

1. Students describe position using the terms over, under, top, middle, bottom, before and after. MC 3-1, 3-2, 3-3
2. Students identify, describe and compare 3D figures (cube, sphere, cone, cylinder). MC 10-1, 10-2

### Teacher notes:

- With the class, complete a chart with picture of shape, name, description, other (sides of equal length, etc.) see appendix
- Use 3D shapes of different sizes and hold them in different orientations for students to analyze and compare.
- Model shapes by building shapes using clay: possible Art center or Art lesson

3. Students match the surface of 3D figures to 2D figures. MC 10-3
4. Students identify and describe 2D figures (square, rectangle, circle, triangle, hexagon). MC 10-4, 10-5

### Teacher notes:

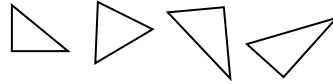
- Chart with picture of shape, name, number of sides, number of corners, other (sides of equal length, etc.) Add HEXAGON. see appendix
- Ask children to identify all the squares or circles that they can find in a particular location or situation.
- Challenge the children by saying “I spy a rectangle or a triangle, who can see it as well?”
- Students should have multiple opportunities to identify shapes; these may be displayed as photographs, or pictures using the document camera or interactive whiteboard.

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5. Students analyze and compare 2D shapes in different forms and orientations. MC 10-8

### Teacher notes:

- Students should be exposed to many types of triangles in many different orientations in order to eliminate the misconception that a triangle is always right-side-up and equilateral.



- Students should also be exposed to many shapes in many different sizes. Examples:
  - Teacher makes pairs of paper shapes that are different sizes. Each student is given one shape and the objective is to find the partner who has the same shape.
  - Teacher brings in a variety of spheres (tennis ball, basketball, globe, ping pong ball, etc) to demonstrate that size doesn't change the name of a shape.

6. Students compose simple shapes to form larger shapes. LA 11-12

### Teacher notes:

Using tangram pieces (or pattern blocks), combine 2 or more shapes to make a new shape, for example, combine 6 green triangles to make a hexagon. Students should describe and name the new shape.

**VOCABULARY:** above, after, before, below, bottom, circle, cone, corner, cube, cylinder, hexagon, middle, over, rectangle, side, sphere, square, top, triangle, under

For illustrated vocabulary cards:

<http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Documents/Vocabulary%20Documents/Vocabulary%20Cards%20Kindergarten.pdf>

### Problem-solving strategies:

Look for a Pattern MC 3-6

Draw a picture MC 10-6

Content to be assessed on **Fall assessment:**



## Grade K Mathematics

**Instructional Strategies:** See Appendix A for research-based Instructional and Differentiated Strategies

**21<sup>st</sup> Century Learning Skills:** See Appendix A for explanations.

**Differentiated Instruction:**

Refer to suggestions and leveled lesson resources at the beginning of each lesson in *Math Connects*.

**Technology and electronic resources:**

*SuccessMaker*

*Math Connects* online learning center for tools, activities and “learn more” experiences

- Internet4Classrooms [http://www.internet4classrooms.com/kplus\\_subjects.htm](http://www.internet4classrooms.com/kplus_subjects.htm) a free web portal designed to assist teachers in finding high-quality, free Internet resources to use in classroom instruction, developing project ideas, and reinforcing specific subject matter.

**Interdisciplinary Connections:**

See suggestions for Cross-Curricular links with art, social studies, health, science, language arts, music, technology and reading, at the beginning of each unit in the *Math Connects* Teacher’s Manual.



## Grade K Mathematics

Priority and Supporting Common Core State Standards	Explanation and Examples
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## Grade K Mathematics

Priority and Supporting Common Core State Standards	Explanation and Examples
<p>The students will work with numbers 11-19 to gain foundations for place value.</p> <p><b>CC.K.NBT.1 COMPOSE and DECOMPOSE numbers from 11-19 into ten ones and some further ones, e.g., by USING objects or drawings, and RECORD each composition or decomposition by a drawing or equation (e.g., <math>18=10+8</math>); UNDERSTAND that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.</b></p>	<p>K.NBT.1 Special attention needs to be paid to this set of numbers as they do not follow a consistent pattern in the verbal counting sequence.</p> <ul style="list-style-type: none"> <li>• Eleven and twelve are special number words.</li> <li>• “Teen” means one “ten” plus ones.</li> <li>• The verbal counting sequence for teen numbers is backwards – we say the ones digit before the tens digit. For example “27” reads tens to ones (twenty-seven), but 17 reads ones to tens (seven-teen).</li> <li>• In order for students to interpret the meaning of written teen numbers, they should read the number as well as describe the quantity. For example, for 15, the students should read “fifteen” and state that it is one group of ten <i>and</i> five ones and record that <math>15 = 10 + 5</math>.</li> </ul> <p>Teaching the teen numbers as one group of ten and extra ones is foundational to understanding both the concept and the symbol that represent 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 ones and four additional ones. Students should connect the representation to the symbol “14.” Students should recognize the pattern that exists in the teen numbers; every teen number is written with a 1 (representing one ten) and ends with the digit that is first stated.</p>

## Grade K Mathematics

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Number  Relationships (zero to 20) <ul style="list-style-type: none"> <li>• Number and quantity</li> <li>• Counting and cardinality</li> <li>• Number names in standard order</li> <li>• Number comparisons (zero to 10)               <ul style="list-style-type: none"> <li>○ Greater than</li> <li>○ Less than</li> <li>○ Equal to</li> </ul> </li> </ul> Written numerals zero to twenty	COUNT (objects)	1
	SAY numbers (in order)	1
	PAIR (each object with one number)	3
	UNDERSTAND <ul style="list-style-type: none"> <li>• (last number name tells objects counted)</li> <li>• (number of objects is the same regardless of arrangement)</li> <li>• (number of objects is the same regardless of order)</li> <li>• (each successive number refers to a quantity that is one larger)</li> </ul>	2
	IDENTIFY/COMPARE groups of objects	1, 2
	WRITE (numbers zero to twenty)	2
	REPRESENT (number of objects with written numeral)	2
	COMPOSE/DECOMPOSE (11-19 into tens and ones) <ul style="list-style-type: none"> <li>• USE (objects, drawings)</li> </ul>	3
	RECORD (using drawing or equation)	3
	UNDERSTAND (numbers 11-19 are composed of ten ones and some more ones)	1

## Grade K Mathematics

Essential Questions	Big Ideas
How can I found out “how many?”	Counting tells how many items there are altogether. When counting, the last number tells the total number of items.
What are some ways you can count objects in a group?	Counting a set in a different order does not change the total.
How can I compare two groups to see which has more or less?	One-to-one correspondence can be used to compare sets.
How can I use words and symbols to show how many in a group?	There is a number word and a matching symbol that tell exactly how many items are in a group.

Mathematical Practices UNIT 3
<p><i>Practices in bold are to be emphasized in the unit.</i></p> <ol style="list-style-type: none"> <li><b>1. Make sense of problems and persevere in solving them.</b></li> <li><b>2. Reason abstractly and quantitatively.</b></li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li><b>4. Model with mathematics.</b></li> <li><b>5. Use appropriate tools strategically.</b></li> <li>6. Attend to precision.</li> <li><b>7. Look for and make use of structure.</b></li> <li><b>8. Look for and express regularity in repeated reasoning.</b></li> </ol>

### Learning Activities:

1. Using concrete objects, students name, recognize, count and write numerals 11-20 MC 6-1, 6-2, 6-3, 6-5, LA 9-10.

**Teacher note:** In addition to the ten frames used in MC, have students use unifix cubes to show that teen numbers are composed of tens and ones. Then have students decompose the ten into 10 ones and other ones (for example, 14 is 10 ones and 4 ones.) This sets a foundation for place value which will be developed in Grade 1.

2. Students compare and order numbers to 20. MC 6-6, 6-7

3. (Introduce) Students count, recognize and write numerals 21-30. MC 8-1,8-2

4. (Introduce) Students compare and order numbers to 30. MC 8-4, 8-5

5. Students estimate a group of objects, then count to verify. MC 8-6

**Teacher note:** estimation jar activities are a good choice for centers.

6. Students rote count to 100.

**Teacher note:** The emphasis of the standard is on the counting sequence to 100.

## Grade K Mathematics

7. Students count by tens to 100 MCCC Lesson 1

**Teacher note:** Use hundred charts to practice counting by tens.

**VOCABULARY:** about, estimate, exact, order, eleven through twenty

For illustrated vocabulary cards:

<http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Documents/Vocabulary%20Documents/Vocabulary%20Cards%20Kindergarten.pdf>

**Problem-solving strategies:**

Look for a Pattern MC 6-4

Make a Model MC 8-3

Content to be assessed on **Winter assessment**

**Instructional Strategies:** See Appendix A for research-based Instructional and Differentiated Strategies

**21<sup>st</sup> Century Learning Skills:** See Appendix A for explanations.

**Differentiated Instruction:**

Refer to suggestions and leveled lesson resources at the beginning of each lesson in *Math Connects*.

**Technology and electronic resources:**

*SuccessMaker*

*Math Connects* online learning center for tools, activities and “learn more” experiences

- Internet4Classrooms [http://www.internet4classrooms.com/kplus\\_subjects.htm](http://www.internet4classrooms.com/kplus_subjects.htm) a free web portal designed to assist teachers in finding high-quality, free Internet resources to use in classroom instruction, developing project ideas, and reinforcing specific subject matter.

**Interdisciplinary Connections:**

See suggestions for Cross-Curricular links with art, social studies, health, science, language arts, music, technology and reading, at the beginning of each unit in the *Math Connects* Teacher’s Manual.

## Grade K Mathematics

Unit of Study 4: Measurement and Data	Pacing: 10 days + 5 days for reteaching/enrichment
<b>DOMAIN</b> and <b>standards:</b> Measurement	
Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>The student will describe and compare measurable attributes.</b>            CC.K.MD.1 DESCRIBE measurable attributes of objects, such as length or weight. DESCRIBE several measurable attributes of a single object.</p> <p><b>CC.K.MD.2 Directly COMPARE two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and DESCRIBE the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.</b></p> <p><b>The student will classify objects and count the number of objects in each category.</b>            CC.K.MD.3 CLASSIFY objects into given categories; COUNT the numbers of objects in each category and SORT the categories by count. (Limit category counts to be less than or equal to 10.)</p>	<p>K.MD.1. In order to describe attributes such as length and weight, students must have many opportunities to informally explore these attributes.</p> <ul style="list-style-type: none"> <li>• Students should compare objects verbally and then focus on specific attributes when making verbal comparisons for K.MD.2. They may identify measurable attributes such as length, width, height, and weight. For example, when describing a soda can, a student may talk about how tall, how wide, how heavy, or how much liquid can fit inside. These are all measurable attributes. Non-measurable attributes include: words on the object, colors, pictures, etc.</li> </ul> <p>K.MD.2 When making direct comparisons for length, students must attend to the "starting point" of each object. For example, the ends need to be lined up at the same point, or students need to compensate when the starting points are not lined up (conservation of length includes understanding that if an object is moved, its length does not change; an important concept when comparing the lengths of two objects).</p> <p>Language plays an important role in this standard as students describe the similarities and differences of measurable attributes of objects (e.g., shorter than, taller than, lighter than, the same as, etc.).</p> <p>K.MD.3. Possible objects to sort include buttons, shells, shapes, beans, etc. After sorting and counting, it is important for students to:</p> <ul style="list-style-type: none"> <li>• explain how they sorted the objects;</li> <li>• label each set with a category;</li> <li>• answer a variety of counting questions that ask, "How many...", and compare sorted groups using words such as "most", "least", "alike", and "different".</li> </ul>



## Grade K Mathematics

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Attributes <ul style="list-style-type: none"> <li>• Measureable</li> <li>• Common</li> <li>• Differences</li> </ul>	DESCRIBE (measureable attributes of objects)	2
	COMPARE (two objects)	4
	DESCRIBE (differences)	2

Essential Questions	Big Ideas
How can an object be measured?	Measurement involves a selected attribute of an object and a comparison of the object being measured against a unit of the same attribute.
How can I describe the difference in length?	Lengths can be compared using ideas such as longer, shorter, and equal

Mathematical Practices UNIT 4
<p><i>Practices in bold are to be emphasized in the unit.</i></p> <ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li><b>2. Reason abstractly and quantitatively.</b></li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li><b>6. Attend to precision.</b></li> <li><b>7. Look for and make use of structure.</b></li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>

## Grade K Mathematics

### Learning Activities:

1. Students compare length and use the words longer/shorter and order length from shortest to longest, MC 7-1

Students compare height and use the words taller/shorter. MCCC lesson 4

*Alternate activity:* Provide children with various objects and have them order them according to their length or height.

Students cut a string that matches their height. Label each string with the student's name. Order strings according to student's height.

2. Students compare weight and use the words heavier/lighter and equal to (or same as.) MC 7-3

*Alternate activity:* Have children hold two objects of obviously differing weights, one in each hand, to compare the weights.

Once children determine which object is heavier, guide the children through how to use a balance scale to compare the same two objects, correlating the lower side of the scale with the heavier object.

**Teacher note:** the following graphing activities help students to sort, classify and count objects in given categories.

3. Students collect and record data on real and bar graphs. MC 5-1, 5-2

4. Students make, read and interpret picture and bar graphs. MC 5-4, 5-5

**Vocabulary:** bar graph, heavier, heavy, length, lighter, longer, picture graph, shorter, same as, weight

For illustrated vocabulary cards:

<http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Documents/Vocabulary%20Documents/Vocabulary%20Cards%20Kindergarten.pdf>

### Problem-solving strategies:

Look for a Pattern MC 5-3

Guess and Check MC 7-4

Content to be assessed on **Winter assessment**

## Grade K Mathematics

**Instructional Strategies:** See Appendix A for research-based Instructional and Differentiated Strategies

**21<sup>st</sup> Century Learning Skills:** See Appendix A for explanations.

**Differentiated Instruction:**

Refer to suggestions and leveled lesson resources at the beginning of each lesson in *Math Connects*.

**Technology and Electronic Resources:**

*SuccessMaker*

*Math Connects* online learning center for tools, activities and “learn more” experiences.

- [www.mathwire.com](http://www.mathwire.com) Site designed to provide activities and appropriate worksheets for teachers to use in their classrooms. All activities and worksheets support the constructivist approach to learning mathematics and the NCTM Standards.
- Internet4Classrooms [http://www.internet4classrooms.com/kplus\\_subjects.htm](http://www.internet4classrooms.com/kplus_subjects.htm) a free web portal designed to assist teachers in finding high-quality, free Internet resources to use in classroom instruction, developing project ideas, and reinforcing specific subject matter.

**Interdisciplinary Connections:**

See suggestions for Cross-Curricular links with art, social studies, health, science, language arts, music, technology and reading, at the beginning of each unit in the *Math Connects* Teacher’s Manual.

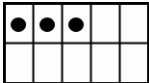
## Grade K Mathematics

Unit of Study 5: Addition and Subtraction within 10	Pacing: 40 days + 5 days for reteaching/enrichment
DOMAINS and standards: Operations and Algebraic Thinking	
Priority and Supporting Common Core State Standards	Explanation and Examples
<p style="background-color: yellow;">The student will understand addition as putting together and adding to, understand subtraction as taking apart and taking from.</p> <p><b>CC.K.OA.1 REPRESENT addition and subtraction with objects, fingers, mental images, drawings (drawings need not show details, but should show the mathematics in the problem), sounds (e.g., claps), ACTING out situations, EXPLAINING verbally, USING expressions, or equations.</b></p> <p>CC.K.OA.2 SOLVE addition and subtraction word problems, and ADD and SUBTRACT within 10, e.g., by using objects or drawings to represent the problem.</p>	<p>K.OA.1. Using addition and subtraction in a word problem context allows students to develop their understanding of what it means to add and subtract.</p> <p>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 “=”.</p> <ul style="list-style-type: none"> <li>• Addition terminology: add, join, put together, plus, combine, total</li> <li>Subtraction terminology: minus, take away, separate, difference, compare</li> </ul> <p>K.OA.2 Using a word problem context allows students to develop their understanding about what it means to add and subtract. Addition is putting together and adding to. Subtraction is taking apart and taking from. Kindergarteners develop the concept of addition/subtraction by modeling the actions in word problem using objects, fingers, mental images, drawings, sounds, acting out situations, and/or verbal explanations. Students may use different representations based on their experiences, preferences, etc. They may connect their conceptual representations of the situation using symbols, expressions, and/or equations. Students should experience the following addition and subtraction problem types (see Table 1).</p> <ul style="list-style-type: none"> <li>• <u>Add To word problems</u>, such as, “Mia had 3 apples. Her friend gave her 2 more. How many does she have now?” <ul style="list-style-type: none"> <li>A student’s “think aloud” of this problem might be, “I know that Mia has some apples and she’s getting some more. So she’s going to end up with more apples than she started with.”</li> </ul> </li> <li>• <u>Take From problems</u> such as: <ul style="list-style-type: none"> <li>José had 8 markers and he gave 2 away. How many does he have now? When modeled, a student would begin with 8 objects and remove two to get the result.</li> </ul> </li> </ul> <p style="text-align: right;">Continued on next page</p>

## Grade K Mathematics

Priority and Supporting Common Core State Standards	Explanation and Examples						
<p><b>CC.K.OA.3 DECOMPOSE</b> numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and <b>RECORD</b> each decomposition by a drawing or equation (e.g., <math>5 = 2 + 3</math> and <math>5 = 4 + 1</math>).</p>	<ul style="list-style-type: none"> <li>Put Together/Take Apart problems with <b>Total Unknown</b> gives students opportunities to work with addition in another context such as:               <ul style="list-style-type: none"> <li>There are 2 red apples on the counter and 3 green apples on the counter. How many apples are on the counter?</li> </ul> </li> <li>Solving Put Together/Take Apart problems with <b>Both Addends Unknown</b> provides students with experiences with finding all the decompositions of a number and investigating the patterns involved.               <ul style="list-style-type: none"> <li>There are 10 apples on the counter. Some are red and some are green. How many apples could be green? How many apples could be red?</li> </ul> </li> </ul> <p>Students may use a document camera or interactive whiteboard to demonstrate addition or subtraction strategies. This gives them the opportunity to communicate and justify their thinking.</p> <p>K.OA.3. This standard focuses on number pairs which add to a specified total, 1-10. These number pairs may be examined either in or out of context.</p> <p>Students may use objects such as cubes, two-color counters, square tiles, etc. to show different number pairs for a given number. For example, for the number 5, students may split a set of 5 objects into 1 and 4, 2 and 3, etc.</p> <p>Students may also use drawings to show different number pairs for a given number. For example, students may draw 5 objects, showing how to decompose in several ways.</p> <div style="text-align: center;"> <p>x x x x x 5 objects</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: 1px solid black; padding: 2px;">x x</td> <td style="border: 1px solid black; padding: 2px;">x x x</td> <td style="padding: 0 10px;">5 = 2 + 3</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">x x x x</td> <td style="border: 1px solid black; padding: 2px;">x</td> <td style="padding: 0 10px;">5 = 4 + 1</td> </tr> </table> </div> <p>Sample unit sequence:</p> <ul style="list-style-type: none"> <li>A contextual problem (word problem) is presented to the students such as, "Mia goes to Nan's house. Nan tells her she may have 5 pieces of fruit to take home. There are lots of apples and bananas. How many of each can she take?"</li> </ul> <p>Continued on next page</p>	x x	x x x	5 = 2 + 3	x x x x	x	5 = 4 + 1
x x	x x x	5 = 2 + 3					
x x x x	x	5 = 4 + 1					

## Grade K Mathematics

Priority and Supporting Common Core State Standards	Explanation and Examples
<p>CC.K.OA.4 For any number from 1 to 9, FIND the number that makes 10 when added to the given number, e.g., by using objects or drawings, and RECORD the answer with a drawing or equation.</p>	<ul style="list-style-type: none"> <li>• Students find related number pairs using objects (such as cubes or two-color counters), drawings, and/or equations. Students may use different representations based on their experiences, preferences, etc.</li> <li>• Students may write equations that equal 5 such as:               <ul style="list-style-type: none"> <li>○ <math>5=4+1</math></li> <li>○ <math>3+2=5</math></li> <li>○ <math>2+3=4+1</math></li> </ul> </li> </ul> <p>This is a good opportunity for students to systematically list all the possible number pairs for a given number. For example, all the number pairs for 5 could be listed as 0+5, 1+4, 2+3, 3+2, 4+1, and 5+0. Students should describe the pattern that they see in the addends, e.g., each number is one less or one than the previous addend.</p> <p>K.OA.4. The number pairs that total ten are foundational for students' ability to work fluently within base-ten numbers and operations. Different models, such as ten-frames, cubes, two-color counters, etc., assist students in visualizing these number pairs for ten.</p> <p>Example 1: Students place three objects on a ten frame and then determine how many more are needed to "make a ten."</p> <div style="text-align: right;">  </div> <p>Example 2: The student snaps ten cubes together to make a "train."</p> <ul style="list-style-type: none"> <li>• Student breaks the "train" into two parts. S/he counts how many are in each part and record the associated equation (<math>10 = \underline{\quad} + \underline{\quad}</math>).</li> <li>• Student breaks the "train into two parts. S/he counts how many are in one part and determines how many are in the other part without directly counting that part. Then s/he records the associated equation (if the counted part has 4 cubes, the equation would be <math>10 = 4 + \underline{\quad}</math>).</li> <li>• Student covers up part of the train, without counting the covered part. S/he counts the cubes that are showing and determines how many are covered up. Then s/he records the associated equation (if the counted part has 7 cubes, the equation would be <math>10 = 7 + \underline{\quad}</math>).</li> </ul> <p>Example 3: The student tosses ten two-color counters on the table and records how many of each color are facing up.</p>

## Grade K Mathematics

### **CC.K.OA.5** Fluently ADD and SUBTRACT within 5.

**K.OA.5.** This standard focuses on students being able to add and subtract numbers within 5. Adding and subtracting fluently refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently.

Strategies students may use to attain fluency include:

- Counting on (e.g., for  $3+2$ , students will state, “3,” and then count on two more, “4, 5,” and state the solution is “5”)
- Counting back (e.g., for  $4-3$ , students will state, “4,” and then count back three, “3, 2, 1” and state the solution is “1”)
- Counting up to subtract (e.g., for  $5-3$ , students will say, “3,” and then count up until they get to 5, keeping track of how many they counted up, stating that the solution is “2”)
- Using doubles (e.g., for  $2+3$ , students may say, “I know that  $2+2$  is 4, and 1 more is 5”)
- Using commutative property (e.g., students may say, “I know that  $2+1=3$ , so  $1+2=3$ ”)
- Using fact families (e.g., students may say, “I know that  $2+3=5$ , so  $5-3=2$ ”)
-

## Grade K Mathematics

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Number Relationship between: <ul style="list-style-type: none"> <li>• Number and quantity</li> <li>• Counting &amp; cardinality</li> <li>• Number names</li> </ul>	REPRESENT (addition and subtraction) with: <ul style="list-style-type: none"> <li>• Objects</li> <li>• Fingers</li> <li>• Drawings</li> <li>• Sounds</li> <li>• Equations</li> <li>• Expressions</li> </ul>	2
Number of objects zero to twenty Written numerals zero to twenty	ACT out addition and subtraction situations	3
Addition	EXPLAIN (addition and subtraction)	2
Subtraction	DECOMPOSE (numbers)	3
Numbers (operations and algebraic thinking) <ul style="list-style-type: none"> <li>• Less than ten</li> <li>• Equal to ten</li> <li>• Pairs</li> </ul>	RECORD (decompositions)	1
	ADD (fluently)	1
	SUBTRACT fluently)	2
Drawings and Equations Addition and subtraction within zero to five		



## Grade K Mathematics

Essential Questions	Big Ideas
How can I solve number problems?	Some real-world problems involving joining, separating, part-part-whole, or comparison can be solved using addition; others can be solved using subtraction.

Mathematical Practices UNIT 5
<p><i>Practices in bold are to be emphasized in the unit.</i></p> <ol style="list-style-type: none"> <li><b>1. Make sense of problems and persevere in solving them.</b></li> <li><b>2. Reason abstractly and quantitatively.</b></li> <li><b>3. Construct viable arguments and critique the reasoning of others.</b></li> <li><b>4. Model with mathematics.</b></li> <li><b>5. Use appropriate tools strategically.</b></li> <li>6. Attend to precision.</li> <li><b>7. Look for and make use of structure.</b></li> <li><b>8. Look for and express regularity in repeated reasoning.</b></li> </ol>

### Learning Activities:

**Teacher note:** Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten in encouraged, but is not required.

1. Students use concrete object to model combining sets and to solve addition problems. MC 11-1, 11-2

**Teacher note:** “Problem of the Day” from *Math Connects* offers daily opportunities for students to model addition and subtracting problems.

2. Students use the symbol + to show addition. MC 11-3

**Teacher note:** substitute the equal symbol for the word *is* in this lesson.

3. Students use concrete objects to show ways to make 4, 5, 6, 7, 8 and 9. MC 11-4, 11-5, 11-6, 11-7, 11-8

4. Students use concrete objects to show ways to make 10. MCCC Lesson 3

*Alternate activities:*

- Using a blank 10-frame (see appendix) and two color counters, have students find all the ways to make a ten. You may also use 2 color unifix cubes for the same activity. Students should record these combinations by using a drawing or an equation.
- *Recording Number Sentences* (Marilyn Burns) see appendix: Using the children’s book *Ten Flashing Fireflies*, students find the various combinations of ten. They represent these combinations with addition and subtraction number sentences.

## Grade K Mathematics

5. Given a 10-frame with part of it filled in (1-9), students find the other addend and record the answer with a drawing or equation.

6. Students use concrete objects to model separating sets and to solve subtraction problems. MC 12-1, 12-2

### Teacher note:

- Note that in context, there are two types of subtraction problems: separate (take-away) and compare. These two types are very different when modeled. Example:  $8 - 2 = 6$ 
  - Separate (take-away) example: “José had 8 markers and he gave 2 away. How many does he have now?” When modeled, a student would begin with 8 objects and remove two to get the result.
  - Comparison example: “José had 8 marbles and Zia had 2. How many more marbles does José have than Zia?” When modeled, a student would make a set of 8 objects and a set of 2 objects and compare the two sets.

7. Students use the symbol - to show subtraction. MC 12-3

8. Students use concrete objects to show ways to subtract from 4, 5, 6, 7, 8, 9 and 10 MC 12-4, 12-5, 12-6, 12-7, 12-8, MCCC Lesson 2

9. Students use the = sign in addition and subtraction sentences. MC 12-10

**VOCABULARY:** add, combine, compare, difference, in all, join, minus, plus, put together, separate, subtract, sum, take away, total, +, -, =

For illustrated vocabulary cards:

<http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Documents/Vocabulary%20Documents/Vocabulary%20Cards%20Kindergarten.pdf>

### Problem-solving strategies:

Act it Out MC 11-9

Guess and Check MC 12-9

Content to be assessed on the **Spring assessment**

## Grade K Mathematics

**Instructional Strategies:** See appendix A for research-based Instructional and Differentiated Strategies

**21<sup>st</sup> Century Learning Skills:** See appendix A for explanations.

### **Differentiated Instruction:**

Refer to suggestions and leveled lesson resources at the beginning of each lesson in *Math Connects*.

### **Technology and Electronic Resources:**

*SuccessMaker*

*Math Connects* online learning center for tools, activities and “learn more” experiences.

- National Library of Virtual Manipulatives [http://nlvm.usu.edu/en/nav/grade\\_g\\_1.html](http://nlvm.usu.edu/en/nav/grade_g_1.html) interactive online manipulatives listed by grade and topic
- Kinderplans.com <http://www.kinderplans.com/content.cfm?pageid=132> Printable Math Activities for Kindergarten and Preschool
- Center for Distance and Online Learning <http://teams.lacoe.edu/teachers/index.asp> source of lesson plans for all areas of math, also includes links to other math sites.
- Internet4Classrooms [http://www.internet4classrooms.com/kplus\\_subjects.htm](http://www.internet4classrooms.com/kplus_subjects.htm) a free web portal designed to assist teachers in finding high-quality, free Internet resources to use in classroom instruction, developing project ideas, and reinforcing specific subject matter.

### **Interdisciplinary Connections:**

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## Grade K Mathematics K-2 Domain Progressions

Domain: Counting and Cardinality		
Kindergarten	Grade 1	Grade 2
<p><b><u>Know number names and the count sequence.</u></b></p> <p>K.CC.1: Count to 100 by ones and by tens.</p> <p>K.CC.2: Count forward beginning from a given number within the known sequence (instead of having to begin at 1).</p> <p>K.CC.3: Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).</p> <p><b><u>Counting to tell the number of objects.</u></b></p> <p>K.CC.4: Understand the relationship between numbers and quantities; connect counting to cardinality.</p> <p style="padding-left: 20px;">a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.</p> <p style="padding-left: 20px;">b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.</p> <p style="padding-left: 20px;">c. Understand that each successive number name refers to a quantity that is one larger.</p> <p>K.CC.5: Count to answer “how many?” questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects.</p> <p><b><u>Comparing numbers.</u></b></p> <p>K.CC.6: Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies. (Note: Include groups with up to ten objects.)</p> <p>K.CC.7: Compare two numbers between 1 and 10 presented as written numerals.</p>	<p>None</p>	<p>None</p>

## Grade K Mathematics

Domain: Operations and Algebraic Thinking		
Kindergarten	Grade 1	Grade 2
<p><b><u>Understanding addition as putting together and adding to, and adding to, and understanding subtraction as taking apart and taking from.</u></b></p> <p>K.OA.1: Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. (Note: Drawings need not show details, but should show the mathematics in the problem – this applies wherever drawings are mentioned in the Standards.)</p> <p>K.OA.2: Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.</p> <p>K.OA.3: Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., <math>5=2+3</math> and <math>5=4+1</math>).</p> <p>K.OA.4: For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.</p> <p>K.OA.5: Fluently add and subtract within 5.</p>	<p><b><u>Represent and solve problems involving addition and subtraction.</u></b></p> <p>1.OA.1: Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. (Note: See Glossary, Table 1.)</p> <p>1.OA.2: Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.</p> <p><b><u>Understand and apply properties of operations and the relationship between addition and subtraction.</u></b></p> <p>1.OA.3: Apply properties of operations as strategies to add and subtract. (Note: Students need not use formal terms for these properties.) <i>Examples: If <math>8+3=11</math> is known, then <math>3+8=11</math> is also known. (Commutative property of addition.) To add <math>2+6+4</math>, the second two numbers can be added to make a ten, so <math>2+6+4=2+10=12</math>. (Associative property of addition.)</i></p> <p>1.OA.4: Understand subtraction as an unknown-addend problem. <i>For example, subtract <math>10-8</math> by finding the number that makes 10 when added to 8.</i></p> <p><b><u>Add and subtract within 20.</u></b></p> <p>1.OA.5: Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).</p> <p>1.OA.6: Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., <math>8+6=8+2+4=10+4=14</math>); decomposing a number leading to a ten (e.g., <math>13-4=13-3-1=10-1=9</math>); using the relationship between addition and subtraction (e.g., knowing that <math>8+4=12</math>, one knows <math>12-8=4</math>); and creating equivalent but easier or known sums (e.g., adding <math>6+7</math> by creating the known equivalent <math>6+6+1=12+1=13</math>).</p> <p><b><u>Work with addition and subtraction equations.</u></b></p> <p>1.OA.7: Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. <i>For example, which of the following equations are true and which are false? <math>6=6</math>, <math>7=8-1</math>, <math>5+2=2+5</math>, <math>4+1=5+2</math>.</i></p> <p>1.OA.8: Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers. <i>For example, determine the unknown number that makes the equation true in each of the equations <math>8+?=11</math>, <math>5=\square-3</math>, <math>6+6=\square</math>.</i></p>	<p><b><u>Represent and solve problems involving addition and subtraction.</u></b></p> <p>2.OA.1: Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (Note: See Glossary, Table 1.)</p> <p><b><u>Add and subtract within 20.</u></b></p> <p>2.OA.2: Fluently add and subtract within 20 using mental strategies. (Note: See standard 1.OA.6 for a list of mental strategies). By end of Grade 2, know from memory all sums of two one-digit numbers.</p> <p><b><u>Work with equal groups of objects to gain foundations for multiplication.</u></b></p> <p>2.OA.3: Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.</p> <p>2.OA.4: Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.</p>

## Domain: Number and Operations in Base Ten

## Grade K Mathematics

Kindergarten	Grade 1	Grade 2
<p><b><u>Working with numbers 11-19 to gain foundations for place value.</u></b></p> <p>K.NBT.1: Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. (Note: Drawings need not show details, but should show the mathematics in the problem – this applies wherever drawings are mentioned in the Standards.)</p>	<p><b><u>Extend the counting sequence.</u></b></p> <p>1.NBT.1: Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.</p> <p><b><u>Understand place value.</u></b></p> <p>1.NBT.2: Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:</p> <p>a. 10 can be thought of as a bundle of ten ones – called a “ten.”</p> <p>b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.</p> <p>c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).</p> <p>1.NBT.3: Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols <math>&gt;</math>, <math>=</math>, and <math>&lt;</math>.</p> <p><b><u>Use place value understanding and properties of operations to add and subtract.</u></b></p> <p>1.NBT.4: Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.</p> <p>1.NBT.5: Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.</p> <p>1.NBT.6: Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.</p>	<p><b><u>Understand place value.</u></b></p> <p>2.NBT.1: Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:</p> <p>a. 100 can be thought of as a bundle of ten tens – called a “hundred.”</p> <p>b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).</p> <p>2.NBT.2: Count within 1000; skip-count by 5s, 10s, and 100s.</p> <p>2.NBT.3: Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.</p> <p>2.NBT.4: Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols to record the results of comparisons.</p> <p><b><u>Use place value understanding and properties of operations to add and subtract.</u></b></p> <p>2.NBT.5: Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.</p> <p>2.NBT.6: Add up to four two-digit numbers using strategies based on place value and properties of operations.</p> <p>2.NBT.7: Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.</p> <p>2.NBT.8: Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.</p> <p>2.NBT.9: Explain why addition and subtraction strategies work, using place value and the properties of operations. (Note: Explanations may be supported by drawings or objects.)</p>

## Grade K Mathematics

Domain: Measurement and Data		
Kindergarten	Grade 1	Grade 2
<p><b><u>Describe and compare measurable attributes.</u></b></p> <p>K.MD.1: Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.</p> <p>K.MD.2: Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference. <i>For example, directly compare the heights of two children and describe one child as taller/shorter.</i></p> <p><b><u>Classify objects and count the number of objects in each category.</u></b></p> <p>K.MD.3: Classify objects or people into given categories; count the numbers in each category and sort the categories by count. (Note: Limit category counts to be less than or equal to 10.)</p>	<p><b><u>Measure lengths indirectly and by iterating length units.</u></b></p> <p>1.MD.1: Order three objects by length; compare the lengths of two objects indirectly by using a third object.</p> <p>1.MD.2: Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.</p> <p><b><u>Tell and write time.</u></b></p> <p>1.MD.3: Tell and write time in hours and half-hours using analog and digital clocks.</p> <p><b><u>Represent and interpret data.</u></b></p> <p>1.MD.4: Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than another.</p>	<p><b><u>Measure and estimate lengths in standard units.</u></b></p> <p>2.MD.1: Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.</p> <p>2.MD.2: Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.</p> <p>2.MD.3: Estimate lengths using units of inches, feet, centimeters, and meters.</p> <p>2.MD.4: Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. Relate addition and subtraction to length.</p> <p>2.MD.5: Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.</p> <p>2.MD.6: Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.</p> <p><b><u>Work with time and money.</u></b></p> <p>2.MD.7: Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.</p> <p>2.MD.8: Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. <i>Example: If you have 2 dimes and 3 pennies, how many cents do you have?</i></p> <p><b><u>Represent and interpret data.</u></b></p> <p>2.MD.9: Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.</p> <p>2.MD.10: Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart, and compare problems using information presented in a bar graph. (Note: See Glossary, Table 1.)</p>

## Grade K Mathematics

Domain: Geometry		
Kindergarten	Grade 1	Grade 2
<p><b><u>Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).</u></b></p> <p>K.G.1: Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as <i>above</i>, <i>below</i>, <i>beside</i>, <i>in front of</i>, <i>behind</i>, and <i>next to</i>.</p> <p>K.G.2: Correctly name shapes regardless of their orientations or overall size.</p> <p>K.G.3: Identify shapes as two-dimensional (lying in a plane, “flat”) or three-dimensional (“solid”).</p> <p><b><u>Analyze, compare, create, and compose shapes.</u></b></p> <p>K.G.4: Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/”corners”) and other attributes (e.g., having sides of equal length).</p> <p>K.G.5: Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.</p> <p>K.G.6: Compose simple shapes to form larger shapes. For example, “<i>Can you join these two triangles with full sides touching to make a rectangle?</i>”</p>	<p><b><u>Reason with shapes and their attributes.</u></b></p> <p>1.G.1: Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.</p> <p>1.G.2: Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. (Note: Students do not need to learn formal names such as “right rectangular prism.”)</p> <p>1.G.3: Partition circles and rectangles into two and four equal shares, describe the shares using the words <i>halves</i>, <i>fourths</i>, and <i>quarters</i>, and use the phrases <i>half of</i>, <i>fourth of</i>, and <i>quarter of</i>. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.</p>	<p>Reason with shapes and their attributes.</p> <p>2.G.1: Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. (Note: Sizes are compared directly or visually, not compared by measuring.) Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.</p> <p>2.G.2: Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.</p> <p>2.G.3: Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words <i>halves</i>, <i>thirds</i>, <i>half of</i>, <i>a third of</i>, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.</p>