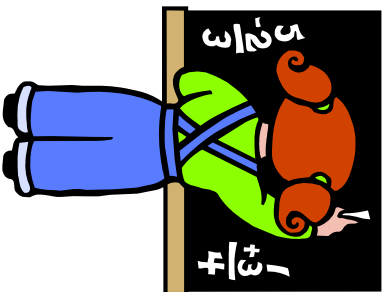


# Mathematics

## Curriculum Grade Two



Approved by Instructional Council on March 27, 2013

## Grade 2 Mathematics

### 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 in Appendix A in 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.2.NBT.1 refers to Common Core, Grade 2, Number and Operations in Base 10, standard 1.

Domain and clusters for Grade 2 can be found on the next page. Standards are listed in the text of the curriculum.

# Grade 2 Mathematics

## Common Core State Standards for Mathematics

### Grade 2

Domains	Operations and Algebraic Thinking	Number & Operations in Base Ten	Measurement and Data	Geometry
Clusters	<ul style="list-style-type: none"> <li>Represent and solve problems involving addition and subtraction</li> <li>Add and subtract within 20</li> <li>Work with equal groups of objects to gain foundations for multiplication</li> </ul>	<ul style="list-style-type: none"> <li>Understand place value</li> <li>Use place value understanding and properties of operations to add and subtract</li> </ul>	<ul style="list-style-type: none"> <li>Measure and estimate lengths in standard units</li> <li>Relate addition and subtraction to length</li> <li>Work with time and money</li> <li>Represent and interpret data</li> </ul>	<ul style="list-style-type: none"> <li>Reason with shapes and their attributes</li> </ul>
Mathematical Practices	<ol style="list-style-type: none"> <li>Make sense of problems and persevere in solving them.</li> <li>Reason abstractly and quantitatively.</li> <li>Construct viable arguments and critique the reasoning of others.</li> <li>Model with mathematics.</li> <li>Use appropriate tools strategically.</li> <li>Attend to precision.</li> <li>Look for and make use of structure.</li> <li>Look for and express regularity in repeated reasoning.</li> </ol>			

In Grade 2, instructional time should focus on four critical areas:

#### 1. *Extending understanding of base-ten notation*

- Students extend their understanding of the base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).

#### 2. *Building fluency with addition and subtraction*

- Students use their understanding of addition to develop fluency with addition and subtraction within 100. They solve problems within 1000 by applying their understanding of models for addition and subtraction, and they develop, discuss, and use efficient, accurate, and generalizable methods to compute sums and differences of whole numbers in base-ten notation, using their understanding of place value and the properties of operations. They select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences for numbers with only tens or only hundreds.

#### 3. *Using standard units of measure*

- Students recognize the need for standard units of measure (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves iteration of units. They recognize that the smaller the unit, the more iterations they need to cover a given length.

#### 4. *Describing and analyzing shapes*

- Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two- and three-dimensional shapes, students develop a foundation for understanding attributes of two- and three-dimensional shapes, students develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades.

**Unit of Study 1: Place Value to 100**

In this unit, students develop number sense using place value.

**Pacing: 10 days + 2 days for reteaching/enrichment****DOMAIN and standards: Number and Operations in Base Ten**

Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>The student will understand place value</b></p> <p><b>CC.2.NBT.1 UNDERSTAND</b> 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.</p> <p><b>UNDERSTAND</b> 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>Students build on their understanding of place value by making bundles of 100s with or without leftovers using base ten blocks, cubes in towers of 10, ten frames, etc. This emphasis on bundling hundreds will support students' discovery of place value patterns.</p> <p>As students are representing the various amounts, it is important that emphasis is placed on the language associated with the quantity. For example, 243 can be expressed in multiple ways such as 2 groups of hundred, 4 groups of ten and 3 ones, as well as 24 tens with 3 ones. When students read numbers, they should read in standard form as well as using place value concepts. For example, 243 should be read as "two hundred forty-three" as well as two hundreds, 4 tens, 3 ones.</p> <p>A document camera or interactive whiteboard can be used to demonstrate "bundling" of objects.</p>
<p><b>CC.2.NBT.2 COUNT</b> within 1000; <b>SKIP-COUNT</b> by 5s, 10s, and 100s.</p>	<p>Students need many opportunities counting, up to 1000, from different starting points. They should also have many experiences skip counting by 5s, 10s, and 100s to develop the concept of place value.</p> <p>Examples:</p> <ul style="list-style-type: none"><li>• The use of the 100s chart may be helpful for students to identify the counting patterns.</li><li>• The use of money (nickels, dimes, dollars) or base ten blocks may be helpful visual cues.</li><li>• The use of an interactive whiteboard may also be used to develop counting skills.</li></ul> <p><b>The goal for second graders is to be able to count in multiple ways with no visual support</b></p>

## Grade 2 Mathematics

Priority and Supporting Common Core State Standards	Explanation and Examples									
<p><b>CC.NBT. 3. READ and WRITE numbers to 100 using base-ten numerals, number names, and expanded form.</b></p> <p>The student will work with equal groups of objects to gain foundations for multiplication.</p> <p>CC.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.</p>	<p>Students need many opportunities reading and writing numerals in multiple ways.</p> <p>Examples:</p> <table><tr><td>• Base-ten numerals</td><td>63</td><td>(standard form)</td></tr><tr><td>• Number names</td><td>sixty three</td><td>(written form)</td></tr><tr><td>• Expanded form</td><td>60 + 3</td><td>(expanded notation)</td></tr></table> <p>When students say the expanded form, it may sound like this: “6 hundreds plus 3 tens plus 7 ones” OR 600 plus 30 plus 7.”</p> <p>Students may investigate if a number is odd or even by determining if the number of objects can be divided into two equal sets, arranged into pairs or counted by twos. After the above experiences, students may derive that they only need to look at the digit in the ones place to determine if a number is odd or even since any number of tens will always split into two even groups. Students need opportunities writing equations representing sums of two equal addends, such as: <math>2 + 2 = 4</math>, <math>3 + 3 = 6</math>, <math>5 + 5 = 10</math>, <math>6 + 6 = 12</math>, or <math>8 + 8 = 16</math>. This understanding will lay the foundation for multiplication and is closely connected to 2.OA.4.</p>	• Base-ten numerals	63	(standard form)	• Number names	sixty three	(written form)	• Expanded form	60 + 3	(expanded notation)
• Base-ten numerals	63	(standard form)								
• Number names	sixty three	(written form)								
• Expanded form	60 + 3	(expanded notation)								

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Two digit numbers represent amounts of ten, and ones (place value) <ul style="list-style-type: none"> <li>10 is equal to ten ones</li> <li>100 is equal to a bundle of ten 10's</li> </ul>	UNDERSTAND (compose) numbers up to 100 <ul style="list-style-type: none"> <li>Tens</li> <li>Ones</li> </ul>	3
Count(ing) <ul style="list-style-type: none"> <li>Within 100</li> <li>By 5s, 10s</li> </ul>	SKIP COUNT (by 5s, 10s)	3
Numbers can be expressed in many ways	READ and WRITE numbers to 100 <ul style="list-style-type: none"> <li>Base 10</li> <li>Number names</li> <li>Expanded form</li> </ul>	3
Numbers are even or odd	DETERMINE even or odd	4

## Grade 2 Mathematics

Essential Questions	Big Ideas
How do I write numbers greater than 9 and 99?	For any number, the place of a digit tells how many ones, tens, hundreds, etc. are represented by that digit.
How does skip counting make it easier to count?	Skip counting generates number patterns.
How can you tell if a number is even or odd?	The structure of the base ten numeration system produces many numerical patterns.

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>1. Make sense of problems and persevere in solving them.</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>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>

### Optional assessments:

- **Am I Ready?** (found at the beginning of the chapter 2 – identifies foundational skills needed to be successful in this unit)
- **Curriculum-based assessment: Ledyard End of Unit 1 assessment** (found in Unit 1 appendix)

### Learning Activities:

1. Students use number lines and hundreds charts to find number patterns. MM 2-1
2. Students skip count by 2, 5, and 10. MM 2-2  
**Teacher note:** students should begin at any number and continue in the pattern, such as “Count by fives, begin at 30. Count by tens, begin at 19.”
3. Students find a pattern to solve problems. MM 2-3
4. Students investigate even and odd numbers. (see Appendix “Evens and Odds”)
5. Students find even and odd numbers in a number pattern. MM 2-6

## Grade 2 Mathematics

6. Students review place value of two-digit numbers. “Handful of Cubes” see appendix

**Teacher note:** see Special Note at the end of this lesson for extending this task.

7. Given a two-digit number orally, students build a model using power of ten rods or unifix cubes, draw a representation of that model, write the number using numerals, then write the number using tens and ones (expanded form).

**Teacher note:** not all students will need to build the model, but can go directly to drawing a picture.

**Teacher note:** place value to 1,000 will be addressed in Unit 8

8. Students practice writing numbers from 1-100.

### UNIT 1 VOCABULARY

digit, even, expanded form, group, odd, ones, place value, same, skip count, tens

**Teacher note:** <http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx> - illustrated vocabulary cards

## Grade 2 Mathematics

### Differentiated Instruction:

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

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

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

### Technology and Electronic Resources:

*SuccessMaker*

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

- Internet 4 Classrooms [http://www.internet4classrooms.com/skills\\_2nd.htm#math](http://www.internet4classrooms.com/skills_2nd.htm#math) - provides math activities and skill builders for grade 2
- Score Mathematics <http://score.kings.k12.ca.us/number.sense.html> - activities linked to both California and NCTM standards
- Apples for the Teacher <http://www.apples4theteacher.com/math.html> - site for math interventions, interactive games, puzzles, and printables
- 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
- Illuminations <http://illuminations.nctm.org/> NCTM website providing activities and lessons (many interactive) by grade level.
- MathWire [www.mathwire.com](http://www.mathwire.com) provides standard-based math activities by grade level
- In On the Ground Floor <http://www.creativille.org/groundfloor/index.htm> - grade 2 skills
- Resource for teachers to successfully implement CCSS. Includes lesson plans, resources and professional development opportunities. [www.ctcorestandards.org](http://www.ctcorestandards.org)



## Grade 2 Mathematics

<b>Unit of Study 2: Basic Addition Concepts</b> <span style="float: right;"><b>Pacing: 10 days + 5 days for reteaching/enrichment</b></span>	
In this unit, students learn strategies for basic addition facts. Students master facts with sums to 20.	
<b>DOMAINS and standards: Operations and Algebraic Thinking, Numbers in Base Ten</b>	
<b>Priority</b> and Supporting Common Core State Standards	Explanation and Examples
<p><b>The student will add and subtract within 20.</b></p> <p><b>CC.2.OA.2</b> Fluently ADD and SUBTRACT within 20 using mental strategies.</p> <p>USE strategies such as:</p> <ul style="list-style-type: none"> <li>• counting on</li> <li>• making ten (e.g., <math>8+6=8+2+4=14</math>)</li> </ul> <p>creating equivalent but easier or known sums (e.g., adding 6+7 by creating the know equivalent <math>6+6+1=12+1+13</math>).</p>	<p>Mental strategies help students make sense of number relationships as they are adding and subtracting within 20. The ability to calculate mentally with efficiency is very important for all students. Mental strategies may include the following:</p> <ul style="list-style-type: none"> <li>• Counting on</li> <li>• Making tens (<math>9 + 7 = 10 + 6</math>)</li> <li>• Decomposing a number leading to a ten ( <math>14 - 6 = 14 - 4 - 2 = 10 - 2 = 8</math> )</li> <li>• Fact families (<math>8 + 5 = 13</math> is the same as <math>13 - 8 = 5</math>)</li> <li>• Doubles</li> <li>• Doubles plus one (<math>7 + 8 = 7 + 7 + 1</math>)</li> </ul> <p>However, the use of objects, diagrams, or interactive whiteboards, and various strategies will help students develop fluency.</p>
<p><b>The student will use place value understanding and properties of operations to add and subtract.</b></p> <p><b>CC.2.NBT.5</b> 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>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. Students should have experiences solving problems written both horizontally and vertically. They need to communicate their thinking and be able to justify their strategies both verbally and with paper and pencil.</p>

## Grade 2 Mathematics

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Fluently add within 20.	ADD USING mental strategy (facts within 20) KNOW (from memory)	1 3
Strategies <ul style="list-style-type: none"> <li>Addition</li> <li>Place value</li> <li>Properties of operations</li> </ul>	EXPLAIN (strategies) USING (place value, properties of operations)	5

Essential Questions	Big Ideas
What strategies can I use to add quickly and accurately?	Two numbers can be added in any order Three (or more) numbers can be grouped and added in any order

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>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>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>

### Optional assessments:

- **Curriculum-based assessment: Ledyard End of Unit 2 assessment** (found in Unit 2 appendix)
- **Am I Ready?** (found at the beginning of the chapter 1 – identifies foundational skills needed to be successful in this unit)

## Grade 2 Mathematics

### Teacher notes:

- When working with addition, use the terminology part + part = whole as you develop this concept.
- This unit reviews strategies for learning basic addition facts (through 20), as these strategies were introduced in Grade 1. By end of Grade 2, **students will demonstrate fluency for addition and subtraction facts within 20.**
- Students need time to practice applying these strategies to facts. *Helping Children Master the Basic Facts* by John Van de Walle (see appendix) lists strategies with activities to practice each. Additional materials can be found in *My Math*. These pages are listed in parentheses.
- After introducing all facts in the order below, Mad Minute worksheets are included in the appendix if you wish to use them for practice.
- Create a chart similar to the one below and add to it as students learn different strategies.

Addition Fact Strategies	
strategy	examples
facts with zero	$0 + 2 = 2$ $3 + 0 = 3$
doubles	$4 + 4 = 8$ $8 + 8 = 16$

### Learning Activities:

1. Students learn that the order of the addends does not affect the sum. MM1-1
2. Students learn the strategy one-more-than and two-more-than. See Van de Walle pg. 99,
3. Students learn the strategy facts with zero. See Van de Walle pg. 100
4. Students learn the strategy, using doubles, to find a sum. See Van de Walle pg. 101
5. Students learn the strategy, doubles plus one, to find a sum. See Van de Walle pg. 101
6. Students learn the strategy, make-ten, to find a sum. See Van de Walle pg. 10
4. Students group addends differently to find sums. MM 1-5
5. Students solve problems by writing a number sentence (equation) MM 1-6

**Teacher note:** Use the terms addition number sentence and addition equation interchangeably.

6. Students work with addition story problems with unknowns in all positions. (see Table 1 on pg. 14)

### Additional materials:

(MM 1-2 count on to add using number lines)  
(MM 1-1 identity property)

(MM 1-3 doubles and near doubles)

(MM 1-4 make a ten)

## Grade 2 Mathematics

### UNIT 2 VOCABULARY

add, addend, altogether, count on, doubles, facts with zero, in all, make-ten, near-doubles, one-more-than, strategy, sum, total, two-more-than

**Teacher note:** <http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx> - illustrated vocabulary cards

### Differentiated Instruction:

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

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

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

### Technology and Electronic Resources:

*SuccessMaker*

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

- Ten Frame <http://illuminations.nctm.org/ActivityDetail.aspx?ID=75> Student interactive site for using a 10-frame to learn basic facts.
- [www.superteacher.com](http://www.superteacher.com) Teacher site for practice sheets on basic addition facts
- Resource for teachers to successfully implement CCSS. Includes lesson plans, resources and professional development opportunities.  
[www.ctcore.org](http://www.ctcore.org)

TABLE 1

Common addition and subtraction situations.

	Result Unknown	Change Unknown	Start Unknown
<b>Add to</b>	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? $2 + 3 = ?$	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? $2 + ? = 5$	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? $? + 3 = 5$
<b>Take from</b>	Five apples were on the table. I ate two apples. How many apples are on the table now? $5 - 2 = ?$	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? $5 - ? = 3$	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? $? - 2 = 3$
	Total Unknown	Addend Unknown	Both Addends Unknown <sup>1</sup>
<b>Put Together/ Take Apart<sup>2</sup></b>	Three red apples and two green apples are on the table. How many apples are on the table? $3 + 2 = ?$	Five apples are on the table. Three are red and the rest are green. How many apples are green? $3 + ? = 5$ , $5 - 3 = ?$	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? $5 = 0 + 5$ , $5 = 5 + 0$ $5 = 1 + 4$ , $5 = 4 + 1$ $5 = 2 + 3$ , $5 = 3 + 2$
	Difference Unknown	Bigger Unknown	Smaller Unknown
<b>Compare<sup>3</sup></b>	<p>("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy?</p> <p>("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie?</p> $2 + ? = 5$ , $5 - 2 = ?$	<p>(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have?</p> <p>(Version with "fewer"): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have?</p> $2 + 3 = ?$ , $3 + 2 = ?$	<p>(Version with "more"): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have?</p> <p>(Version with "fewer"): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have?</p> $5 - 3 = ?$ , $? + 3 = 5$

<sup>1</sup>These take apart situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children understand that the = sign does not always mean makes or results in but always does mean is the same number as.

<sup>2</sup>Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of this basic situation, especially for small numbers less than or equal to 10.

<sup>3</sup>For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operation (the version using more for the bigger unknown and using less for the smaller unknown). The other versions are more difficult.

## Grade 2 Mathematics

### Unit of Study 3: Basic Subtraction Concepts

**Pacing: 10 days + 5 days for reteaching/enrichment**

In this unit, students learn strategies for basic subtraction facts. Students master facts with differences to 20.

#### DOMAIN and standards: Operations and Algebraic Thinking

Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>The student will add and subtract within 20.</b></p> <p><b>CC.2.OA.2 Fluently ADD and SUBTRACT within 20 using mental strategies.</b></p> <p><b>USE strategies such as:</b></p> <ul style="list-style-type: none"> <li>• counting on</li> <li>• making ten (e.g., <math>8+6=8+2+4=14</math>)</li> <li>• creating equivalent but easier or known sums (e.g., adding <math>6+7</math> by creating the know equivalent <math>6+6+1=12+1+13</math>).</li> </ul>	<p>Mental strategies help students make sense of number relationships as they are adding and subtracting within 20. The ability to calculate mentally with efficiency is very important for all students. Mental strategies may include the following:</p> <ul style="list-style-type: none"> <li>• Counting back</li> <li>• Decomposing a number leading to a ten ( <math>14 - 6 = 14 - 4 - 2 = 10 - 2 = 8</math> )</li> <li>• Fact families (<math>8 + 5 = 13</math> is the same as <math>13 - 8 = 5</math>)</li> <li>• Doubles</li> </ul> <p>However, the use of objects, diagrams, or interactive whiteboards, and various strategies will help students develop fluency.</p>

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Fluently subtract within 20.	SUBTRACT USING mental strategy (facts within 20)  KNOW (from memory)	1  3

Essential Questions	Big Ideas
What strategies can I use to subtract quickly and accurately?	Subtraction facts can be found by thinking of the related addition fact. Numbers can be broken apart and grouped in different ways to make calculations simple.

## Grade 2 Mathematics

### Mathematical Practices UNIT 3

*Practices in bold are to be emphasized in the unit.*

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.**

#### Optional assessments:

- Curriculum-based assessment: **Ledyard End of Unit 3 assessment** (found in Unit 3 appendix)

:

#### Teacher notes:

- When working with subtraction, use the terminology whole – part = part as you develop this concept.
- This unit reviews strategies for learning basic subtraction facts as they have been introduced in Grade 1. By end of Grade 2, **students will demonstrate fluency for addition and subtraction facts within 20.**  
Students need time to practice applying these strategies to facts. *Helping Children Master the Basic Facts* by John Van de Walle (see Appendix in previous unit) lists strategies with activities to practice each. Additional materials can be found in *My Math*. These pages are listed in parentheses.
- After introducing all facts in the order below, Mad Minute worksheets are included in the appendix if you wish to use them for practice.
- Create a chart similar to the one below and add to it as students learn different strategies.

Subtraction Fact Strategies	
strategy	example
think addition	For $13 - 7 = ?$ , think $7 + ? = 13$

#### Learning Activities:

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1. Using a number line, students count back to find the difference. MM 1-7
2. Students subtract all or none to find the difference. MM 1-8
3. Students use doubles to subtract. MM1-9
4. Students learn the strategy, Think-Addition, to find a difference. See Van de Walle pg. 106
5. Students use related facts to write fact families. MM1-12
6. Students learn the strategy, Build Up Through 10, to find a difference. See Van de Walle pg. 108.
7. Students learn the strategy, Back Down Through 10, to find a difference. See Van de Walle pg. 109
8. Students work with subtraction story problems with unknowns in all positions. (see Table 1 on pg. 13)
9. Students solve 2-step problems MM 1-13

### Additional materials:

(MM 1-10 use addition facts to subtract)  
(MM 1-11 find missing addends)

### UNIT 3 VOCABULARY

count back, difference, fact family, minus, subtract, subtract all, subtract none, think addition, use doubles

**Teacher note:** <http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx> - illustrated vocabulary cards



## Grade 2 Mathematics

### **Differentiated Instruction:**

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

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

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

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

*SuccessMaker*

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

- Ten Frame <http://illuminations.nctm.org/ActivityDetail.aspx?ID=75> Student interactive site for using a 10-frame to learn basic facts.
- [www.superteacher.com](http://www.superteacher.com) Teacher site for practice sheets on basic subtraction facts
- Resource for teachers to successfully implement CCSS. Includes lesson plans, resources and professional development opportunities.  
[www.ctcore.org](http://www.ctcore.org)

## Grade 2 Mathematics

### Unit of Study 4: Working with Data

In this unit, students collect, organize and analyze data.

**Pacing: 10 days + 2 days for reteaching/enrichment**

#### DOMAIN and standards: Measurement and Data, Operations and Algebraic Thinking

##### Priority and Supporting Common Core State Standards

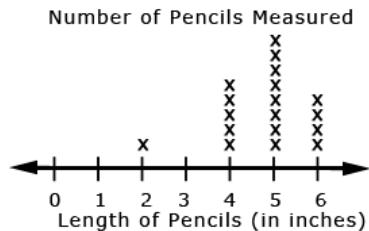
**The students will represent and interpret data.**

**CC.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.

**CC.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.

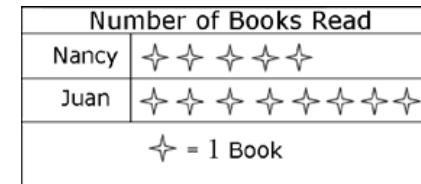
This standard emphasizes representing data using a line plot. A line plot can be thought of as plotting data on a number line.



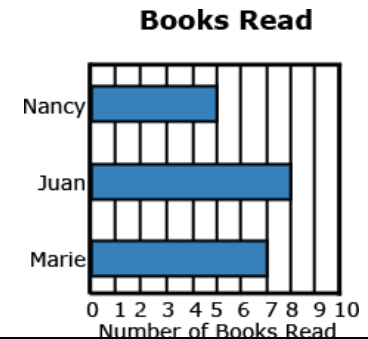
##### Explanation and Examples

Students should draw both picture and bar graphs representing data that can be sorted up to four categories using single unit scales (e.g., scales should count by ones). The data should be used to solve put together, take-apart, and compare problems as listed in Table 1.

In second grade, picture graphs (pictographs) **include symbols that represent single units**. Pictographs should include a title, categories, category label, key, and data.



Second graders should draw both horizontal and vertical bar graphs. Bar graphs include title, scale, scale label, categories, category label, and data.



## Grade 2 Mathematics

Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>The students will represent and solve problems involving addition and subtraction.</b></p> <p><b>CC.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.</b></p>	<p>Word problems that are connected to students' lives can be used to develop fluency with addition and subtraction. <b>Table 1</b> describes the four different addition and subtraction situations and their relationship to the position of the unknown.</p> <p>Examples:</p> <ul style="list-style-type: none"> <li>• Take-from example: David had 63 stickers. He gave 37 to Susan. How many stickers does David have now? <math>63 - 37 =</math></li> <li>• Add to example: David had \$37. His grandpa gave him some money for his birthday. Now he has \$63. How much money did David's grandpa give him? <math>\\$37 + = \\$63</math></li> <li>• Compare example: David has 63 stickers. Susan has 37 stickers. How many more stickers does David have than Susan? <math>63 - 37 =</math></li> </ul> <p>o Even though the modeling of the two problems above is different, the equation, <math>63 - 37 = ?</math>, can represent both situations (How many more do I need to make 63?)</p> <ul style="list-style-type: none"> <li>• Take-from (Start Unknown) David had some stickers. He gave 37 to Susan. Now he has 26 stickers. How many stickers did David have before? <math>- 37 = 26</math></li> </ul> <p>It is important to attend to the difficulty level of the problem situations in relation to the position of the unknown.</p> <ul style="list-style-type: none"> <li>• Result Unknown problems are the least complex for students followed by Total Unknown and Difference Unknown.</li> <li>• The next level of difficulty includes Change Unknown, Addend Unknown, followed by Bigger Unknown.</li> <li>• The most difficult are Start Unknown, Both Addends Unknown, and Smaller Unknown.</li> </ul> <p>Second grade students should work on ALL problem types regardless of the level of difficulty. Students can use interactive whiteboard or document camera to demonstrate and justify their thinking.</p>

## Grade 2 Mathematics

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Graphs represent data	DRAW picture and bar graphs, line plots	3
Solve problems using data in graphs	SOLVE simple problems based on data in graphs	4
Add and subtract within 100 to solve <ul style="list-style-type: none"> <li>• One and two step problems involving situations of:               <ul style="list-style-type: none"> <li>○ Adding to</li> <li>○ Taking from</li> <li>○ Putting together</li> <li>○ Taking apart</li> <li>○ Comparing</li> </ul> </li> </ul>	USE (addition and subtraction) SOLVE (one and two step word problems)	3 4

Essential Questions	Big Ideas
How can I organize data?	Data can be represented using tables, charts and graphs.
What are some questions you can ask and answer using data found in a graph?	Some questions can be answered by collecting and analyzing data.

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><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><b>6. Attend to precision.</b></li> <li>7. Look for and make use of structure.</li> <li><b>8. Look for and express regularity in repeated reasoning.</b></li> </ol>

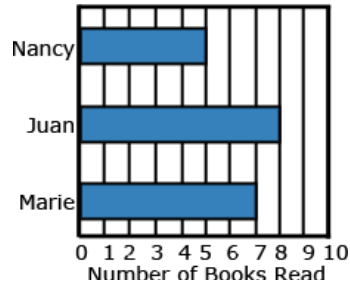
## Grade 2 Mathematics

### Optional assessments:

- **Am I Ready?** (found at the beginning of the chapter 9 – identifies foundational skills needed to be successful in this unit)
- **Curriculum-based assessment: Ledyard End of Unit 4 assessment** (found in Unit 4 appendix)

**Teacher notes:** use the following types of questions when interpreting graphs:

**Books Read**



1. How many books did Nancy and Juan read *in all*?
2. *How many more* books did Juan read than Marie?
3. *How many fewer* books did Nancy read than Marie?
4. Who read the *most* books?
5. Who read the *least* books?
6. How many books were read *altogether*?

### Learning Activities:

1. Students take a survey and organize data using tally marks. MM 9-1
2. Students use data to create picture graphs. MM 9-2  
**Teacher note:** Picture graphs (pictographs) should include symbols that represent single units. Pictographs should also include a title, categories, category label, key, and data. The scale should count by ones.
3. Students analyze data in picture graphs. MM 9-3
4. Students create bar graphs to show data. MM 9-4
5. Students draw conclusions and answer questions based on a bar graph. . MM 9-5
6. Students solve problems using the Make a Table strategy. MM 9-6

## Grade 2 Mathematics

7. Students use data to create line plots. MM 9-7

### Teacher notes:

- In this unit, grade 2 students are introduced to line plots. They will use line plots in Unit 10 when working with measurement.
- See Appendix for an explanation of how to make a line plot and leveled worksheets for students.
- Interactive website for interpreting line plots: <http://www.ixl.com/math/grade-3/line-plots>

### Additional activities:

- Provide children with published graphs, from sources such as children's magazines, social studies and science materials. Have children analyze the information in the graph and ask each other questions that can be answered with the information in the graph.
- Have children examine data in the class attendance chart, weather chart or calendar to describe any noticeable patterns and make predictions.
- Give each child an individual box of raisins. Use at least two different brands of raisins. Have children estimate the number of raisins in each box before counting, and then compare the actual counts to their estimates. Lead the class in the discussion and creation of a graph using the raisin boxes. Are all boxes of raisins created equal? Which brand should your family purchase?
- provide ongoing opportunities throughout the year for students to collect data and make graphs.

8. Students analyze data on a line plot. MM 9-8

## UNIT 4 VOCABULARY

bar graph, data, graph, key, line plot, picture graph (pictograph), predict, scale, survey, table

**Teacher note:** <http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx> - illustrated vocabulary cards

### Differentiated Instruction:

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

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

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

### Technology and Electronic Resources:

*SuccessMaker*

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

- Eye to Eye: <http://illuminations.nctm.org/LessonDetail.aspx?ID=L169> - students collect data on eye color
- What's the Weather? <http://illuminations.nctm.org/LessonDetail.aspx?ID=L196> - students analyze information represented by pictographs.
- Resource for teachers to successfully implement CCSS. Includes lesson plans, resources and professional development opportunities.  
[www.ctcore.org](http://www.ctcore.org)

## Grade 2 Mathematics

**Unit of Study 5: Computation-Addition:** Using their understanding of place value and basic facts, students add two-digit numbers.

**Pacing: 10 days + 2 days for reteaching/enrichment**

**DOMAINS and standards:** Number and Operations in Base Ten, Operations and Algebraic Thinking

Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>The student will understand place value.</b>            CC.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> <ul style="list-style-type: none"> <li>a. 100 can be thought of as a bundle of ten tens—called a “hundred.”</li> <li>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).</li> </ul>	
<p><b>The student will use place value understanding and properties of operations to add and subtract.</b>            CC.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>Students need to communicate their thinking and be able to justify their strategies both verbally and with paper and pencil.</p> <p>Addition strategies based on place value for <math>48 + 37</math> may include:</p> <ul style="list-style-type: none"> <li>• Adding by place value: <math>40 + 30 = 70</math> and <math>8 + 7 = 15</math> and <math>70 + 15 = 85</math>.</li> <li>• Incremental adding (breaking one number into tens and ones); <math>48 + 10 = 58</math>, <math>58 + 10 = 68</math>, <math>68 + 10 = 78</math>, <math>78 + 7 = 85</math></li> <li>• Compensation (making a friendly number): <math>48 + 2 = 50</math>, <math>37 - 2 = 35</math>, <math>50 + 35 = 85</math></li> </ul> <p>Properties that students should know and use are:</p> <ul style="list-style-type: none"> <li>• Commutative property of addition (Example: <math>3 + 5 = 5 + 3</math>)</li> <li>• Associative property of addition (Example: <math>(2 + 7) + 3 = 2 + (7+3)</math> )</li> <li>• Identity property of 0 (Example: <math>8 + 0 = 8</math>)</li> </ul>

## Grade 2 Mathematics

Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>CC.2.NBT.9. EXPLAIN</b> why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)</p>	<p>Students need multiple opportunities explaining their addition and subtraction thinking. Operations embedded within a meaningful context promote development of reasoning and justification.</p> <p>Example: Mason read 473 pages in June. He read 227 pages in July. How many pages did Mason read altogether?</p> <ul style="list-style-type: none"> <li>• Karla's explanation: <math>473 + 227 = \underline{\hspace{2cm}}</math>. I added the ones together (<math>3 + 7</math>) and got 10. Then I added the tens together (<math>70 + 20</math>) and got 90. I knew that <math>400 + 200</math> was 600. So I added <math>10 + 90</math> for 100 and added <math>100 + 600</math> and found out that Mason had read 700 pages altogether.</li> <li>• Debbie's explanation: <math>473 + 227 = \underline{\hspace{2cm}}</math>. I started by adding 200 to 473 and got 673. Then I added 20 to 673 and I got 693 and finally I added 7 to 693 and I knew that Mason had read 700 pages altogether.</li> <li>• Becky's explanation: I used base ten blocks on a base ten mat to help me solve this problem. I added 3 ones (units) plus 7 ones and got 10 ones which made one ten. I moved the 1 ten to the tens place. I then added 7 tens rods plus 2 tens rods plus 1 tens rod and got 10 tens or 100. I moved the 1 hundred to the hundreds place. Then I added 4 hundreds plus 2 hundreds plus 1 hundred and got 7 hundreds or 700. So Mason read 700 books.</li> </ul> <p>Students should be able to connect different representations and explain the connections. Representations can include numbers, words (including mathematical language), pictures, number lines, and/or physical objects. Students should be able to use any/all of these representations as needed.</p>
<p>The student will represent and solve problems involving addition and subtraction.</p> <p>CC.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. (See Table 1 from previous unit)</p>	<p>Table 1 describes the four different addition and subtraction situations and their relationship to the position of the unknown. (see Unit 2)</p>



## Grade 2 Mathematics

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Two digit numbers represent amounts of ten, and ones (place value) <ul style="list-style-type: none"> <li>10 is equal to ten ones</li> <li>100 is equal to a bundle of ten 10's</li> </ul>	UNDERSTAND (compose) numbers up to 100 <ul style="list-style-type: none"> <li>Tens</li> <li>Ones</li> </ul>	3
	ADD AND SUBTRACT (fluently)	2
Add and subtract within 100 <ul style="list-style-type: none"> <li>Use place value strategies</li> <li>Properties of operations</li> <li>Relationship between addition and subtraction</li> </ul>	USE (strategies, properties of operations and relationship between addition and subtraction)	3
	EXPLAIN (strategies)	2
Solve problems (addition and subtraction)	USE addition and subtraction SOLVE word problems	3 4

Essential Questions	Big Ideas
What strategies can I use to solve word 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>

## Grade 2 Mathematics

### Optional assessments:

- **Am I Ready?** (found at the beginning of the chapter 3 – identifies foundational skills needed to be successful in this unit)
- **Curriculum-based assessment: Ledyard End of Unit 5 assessment** (found in Unit 5 appendix)

### Learning Activities:

1. Students take apart (decompose) an addend to make a ten and add. MM 3-1
2. Students use models to regroup ones as tens to add. MM 3-2

#### Teacher notes:

- Students should have many opportunities to write numbers in regrouped form by trading tens and ones and recording, such as,  $38 = 3 \text{ tens and } 8 \text{ ones}$ ,  $2 \text{ tens and } 18 \text{ ones}$ ,  $1 \text{ ten and } 28 \text{ ones}$  or  $38 \text{ ones}$ . The activity “Different Ways” (located in appendix Unit 1) includes questions for discussion and extensions.
3. Students add one-digit to two-digit numbers. MM 3-3
  4. Students add two-digit numbers with and without regrouping. MM 3-4
  5. Students rewrite horizontal problems vertically to add. MM 3-5
  6. Students solve problems using the Make a Model strategy MM 3-7

### UNIT 5 VOCABULARY

decompose a ten, estimate, regroup, round

**Teacher note:** illustrated vocabulary cards **Teacher note:**

<http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx> - illustrated vocabulary cards

## Grade 2 Mathematics

### Differentiated Instruction:

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

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

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

### Technology and Electronic Resources:

*SuccessMaker*

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

- A counting lesson for two digit numbers <http://www.sasked.gov.sk.ca/docs/elemath/gr2lessp.html> - provides integrated lesson plans
- In On the Ground Floor <http://www.creativille.org/groundfloor/index.htm> - grade 2 skills
- Resource for teachers to successfully implement CCSS. Includes lesson plans, resources and professional development opportunities.  
[www.ctcore.org](http://www.ctcore.org)

### 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 2 Mathematics

**Unit of Study 6: Computation - Subtraction:** Using their understanding of place value and basic facts, students subtract two-digit numbers.  
**Pacing: 10 days + 5 days for reteaching/enrichment**

**DOMAIN and standards:** Number and Operations in Base Ten, Operations and Algebraic Thinking

Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>The student will understand place value.</b>            CC.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> <ul style="list-style-type: none"> <li>a. 100 can be thought of as a bundle of ten tens—called a “hundred.”</li> <li>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).</li> </ul>	
<p><b>The student will use place value understanding and properties of operations to add and subtract.</b>            CC.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>Students need to communicate their thinking and be able to justify their strategies both verbally and with paper and pencil.            Subtraction strategies based on place value for <math>81 - 37</math> may include:</p> <ul style="list-style-type: none"> <li>• Adding Up (from smaller number to larger number): <math>37 + 3 = 40</math>, <math>40 + 40 = 80</math>, <math>80 + 1 = 81</math>, and <math>3 + 40 + 1 = 44</math>.</li> <li>• Incremental subtracting: <math>81 - 10 = 71</math>, <math>71 - 10 = 61</math>, <math>61 - 10 = 51</math>, <math>51 - 7 = 44</math></li> <li>• Subtracting by place value: <math>81 - 30 = 51</math>, <math>51 - 7 = 44</math></li> </ul>
<p><b>CC.2.NBT.9. EXPLAIN why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)</b></p>	<p>Students need multiple opportunities explaining their addition and subtraction thinking. Operations embedded within a meaningful context promote development of reasoning and justification.            Students should be able to connect different representations and explain the connections. Representations can include numbers, words (including mathematical language), pictures, number lines, and/or physical objects.            Students should be able to use any/all of these representations as needed.</p>
<p><b>The student will represent and solve problems involving addition and subtraction.</b>            CC.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. (See Table 1 from Unit 2)</p>	<p>Table 1 describes the four different addition and subtraction situations and their relationship to the position of the unknown.</p>

## Grade 2 Mathematics

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Two digit numbers represent amounts of ten, and ones (place value) <ul style="list-style-type: none"> <li>10 is equal to ten ones</li> <li>100 is equal to a bundle of ten 10's</li> </ul>	UNDERSTAND (compose) numbers up to 100 <ul style="list-style-type: none"> <li>Tens</li> <li>Ones</li> </ul>	3
Add and subtract within 100 <ul style="list-style-type: none"> <li>Use place value strategies</li> <li>Properties of operations</li> <li>Relationship between addition and subtraction</li> </ul>	ADD AND SUBTRACT (fluently)  USE (strategies, properties of operations and relationship between addition and subtraction)  EXPLAIN (strategies)	2 3 2
Solve problems (addition and subtraction)	USE addition and subtraction SOLVE word problems	3 4

Essential Questions	Big Ideas
What strategies can I use to solve word 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 6
<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>

## Grade 2 Mathematics

### Optional assessments:

- **Am I Ready?** (found at the beginning of the chapter 4 – identifies foundational skills needed to be successful in this unit)
- **Curriculum-based assessment: Ledyard End of Unit 6 assessment** (found in Unit 6 appendix)

### Learning Activities:

1. Students use related facts to make two-digit fact families. MM 4-1
2. Students take apart (decompose) numbers to make a ten to subtract. MM 4-2
3. Students use models to regroup and find differences. MM 4-3  
**Teacher note:** students need to explain why subtraction strategies work, using place value. (Explanations may be supported by drawings or objects.)
4. Students subtract one-digit numbers from two-digit numbers. MM 4-4
5. Students subtract two-digit numbers. MM 4-5
6. Students rewrite horizontal two-digit equations vertically and find differences. MM 4-6
7. Students use addition to check subtraction. MM 4-7
7. Students solve problems by writing equations. MM 4-8
8. Students read and solve two-step word problems. MM 4-9
10. Students use 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. (See Table 1 in Unit 2)  
**Teacher note:** see appendix for resources involving finding missing addends, solving problems with unknown in different positions, and solving two-step problems.

### UNIT 6 VOCABULARY

decompose a ten, difference, estimate, regroup, round, subtract

**Teacher note:** <http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx> - illustrated vocabulary cards

## Grade 2 Mathematics

### **Differentiated Instruction:**

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

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

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

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

*SuccessMaker*

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

- Comparing Connecting Cubes <http://illuminations.nctm.org/LessonDetail.aspx?id=U41> students explore five models of subtraction (counting, sets, number line, balanced equations, and inverse of addition) using connecting cubes.
- A counting lesson for two digit numbers <http://www.sasked.gov.sk.ca/docs/elemath/gr2lessp.html> - provides integrated lesson plans
- Resource for teachers to successfully implement CCSS. Includes lesson plans, resources and professional development opportunities. [www.ctcore.org](http://www.ctcore.org)

## Grade 2 Mathematics

### Unit of Study 7 Money and Time

**Pacing: 20 days + 5 days for reteaching/enrichment**

In this unit, students count coins, use dollars and add and subtract money. Students also read and write time.

#### DOMAINS and standards: Measurement and Data

Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>The student will work with time and money.</b></p> <p><b>CC.2.MD.7 TELL and WRITE time from analog and digital clocks to the nearest five minutes, using a.m. and p.m</b></p>	<p>In first grade, students learned to tell time to the nearest hour and half-hour. Students build on this understanding in second grade by skip-counting by 5 to recognize 5-minute intervals on the clock. They need exposure to both digital and analog clocks. It is important that they can recognize time in both formats and communicate their understanding of time using both numbers and language. Common time phrases include the following: quarter till ____, quarter after ____, ten till ____, ten after ____, and half past ____.</p> <p>Students should understand that there are 2 cycles of 12 hours in a day - a.m. and p.m. Recording their daily actions in a journal would be helpful for making real-world connections and understanding the difference between these two cycles.</p>
<p><b>CC.2.MD.8 SOLVE word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ (dollars) and ¢ (cents) symbols appropriately.</b></p> <p><b>Example: If you have 2 dimes and 3 pennies, how many cents do you have?</b></p>	<p>Since money is not specifically addressed in kindergarten, first grade, or third grade, students should have multiple opportunities to identify, count, recognize, and use coins and bills in and out of context. They should also experience making equivalent amounts using both coins and bills. "Dollar bills" should include denominations up to one hundred (\$1.00, \$5.00, \$10.00, \$20.00, \$100.00).</p> <p>Students should solve story problems connecting the different representations. These representations may include objects, pictures, charts, tables, words, and/or numbers. Students should communicate their mathematical thinking and justify their answers.</p> <p>Example:</p> <ul style="list-style-type: none"> <li>• Sandra went to the store and received \$ 0.76 in change. What are three different sets of coins she could have received?</li> </ul>
<p><b>The student will understand place value.</b></p> <p><b>CC.2.NBT.2. COUNT within 1000; skip-count by 5s, 10s, and 100s.</b></p>	
<p><b>The student will reason with shapes and their attributes.</b></p> <p><b>CC.2.G.3. PARTITION circles into two or four equal shares, DESCRIBE the shares using the words <i>halves</i>, <i>half of</i>, <i>a quarter of</i>, etc., DESCRIBE the whole as two halves, four fourths.</b></p>	<p>Students divide an analog clock into halves and fourths (quarters) .</p>



## Grade 2 Mathematics

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Time <ul style="list-style-type: none"> <li>Analog</li> <li>Digital</li> <li>Nearest 5 minutes</li> <li>a.m. and p.m.</li> </ul>	TELL (time) WRITE (time) USE (a.m., p.m.) PARTITION (circles – halves, quarters)	1 2 3 3
Count(ing) <ul style="list-style-type: none"> <li>Within 1000</li> <li>By 5s, 10s, 100s</li> </ul>	SKIP COUNT (by 5s, 10s, 100s)	3
Word problem with money <ul style="list-style-type: none"> <li>Dollar bills</li> <li>Quarters</li> <li>Dimes</li> <li>Nickels</li> <li>Pennies</li> </ul>	SOLVE (word problems) involving money	4
Symbols <ul style="list-style-type: none"> <li>\$</li> <li>¢</li> </ul>	USE (symbols)	1, 2

Essential Questions	Big Ideas
How are an analog and a digital clock alike? How are they different? Why do I need to tell time in daily life?	A given time of day can be represented in more than one way.
How does knowing coins and their values help me in real life?	There are different combinations of coins that show the same amount.

## Grade 2 Mathematics

### Mathematical Practices UNIT 7

*Practices in bold are to be emphasized in the unit.*

- 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.**

#### Optional assessments:

- **Am I Ready?** (found at the beginning of the chapter 8 and 10 – identifies foundational skills needed to be successful in this unit)
- **Curriculum-based assessment: Ledyard End of Unit 7 assessment** (found in Unit 7 appendix)

**Learning Activities for Money:** This unit is based on a Marilyn Burns Replacement Unit *Math By All Means: Money* by Jane Crawford. Refer to this resource for the following activities (pgs. 5-7 gives a brief overview and pgs 14-15 states objectives for the unit.) Support with menu item activities.

1. Students examine coins with a hand lens to gather information about coins and to compare coins. “Coins and Magnifiers” pg. 27
2. Students compare dates on pennies and their birthdates and use this data to create graphs. “Dates” pg. 35
3. Students use a book club order to buy books and use a calculator to figure out how much they spent. “Catalog Shopping” pg. 47  
**Teacher note:** have calculators available for this activity.
4. Students combine and count pennies, nickels and dimes. “Combinations of Coins” pg. 54

#### Support with:

- MM 8-1 (count to find the value of pennies, nickels and dimes)
- MM 8-2 (find the value of a group of coins containing quarters and half-dollars)
- MM 8-3 (skip count to determine the value of a group of coins)
- MM 8-4 (problem solve using Act It Out strategy involving coins)
- MM 8-5 (use coins to make one dollar)

## Grade 2 Mathematics

**Teacher note:** Given a money amount such as 25¢ students need many opportunities to show and record 3 ways to make that amount using different coins.

### Learning Activities for Time:

1. Given two paper circles, student fold (partition) to show and label two equal parts (called halves) and 4 equal parts (called fourths or quarters) .
2. Students tell and write time to the nearest hour. MM 10-1
3. Students tell and write time to the nearest half hour. MM 10-2
4. Students solve problems by finding a pattern, involving time. MM 10-3
5. Students tell and write time to the nearest quarter hour. MM 10-4
6. Students tell and write time to the nearest five minutes. MM 10-5
7. Students use am and pm when telling and writing time. MM 10-6

### Alternate Activities:

- The children create a journal entry describing their day at school. Stamp a clock face on the journal page and write a time underneath that has been written on the board. Each child should draw hands on the clock face to show the time correctly. When the actual time of day on the classroom clock matches the time on the journal page, students record what they are doing in pictures and words next to the correct clock face.

**UNIT 7 VOCABULARY** cent (¢), clock, dime, dollar (\$), half-dollar, half hour, hour, minute, nickel, partition, penny, quarter, quarter hour, second, trade

**Teacher note:** <http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx> - illustrated vocabulary cards

## Grade 2 Mathematics

### **Differentiated Instruction:**

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

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

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

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

*SuccessMaker*

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

- MathWire [www.mathwire.com](http://www.mathwire.com) provides standard-based math activities by grade level
- Resource for teachers to successfully implement CCSS. Includes lesson plans, resources and professional development opportunities.  
[www.ctcore.org](http://www.ctcore.org)

## Grade 2 Mathematics

### Unit of Study 8: Place Value (to 1,000)

**Pacing: 10 days + 5 days for reteaching/enrichment**

In this unit, students read, write and compare numbers up to 1,000 and use patterns to solve problems.

#### DOMAINS and standards: Number and Operations in Base Ten

Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>The students will understand place value.</b></p> <p><b>CC.2.NBT.1 UNDERSTAND</b> 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.  <b>UNDERSTAND</b> the following as special cases:  a. 100 can be thought of as a bundle of ten tens - called a "hundred."  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>Students build on their understanding of place value by making bundles of 100s with or without leftovers using base ten blocks, cubes in towers of 10, ten frames, etc. This emphasis on bundling hundreds will support students' discovery of place value patterns.</p> <p>As students are representing the various amounts, it is important that emphasis is placed on the language associated with the quantity. For example, 243 can be expressed in multiple ways such as 2 groups of hundred, 4 groups of ten and 3 ones, as well as 24 tens with 3 ones. When students read numbers, they should read in standard form as well as using place value concepts. For example, 243 should be read as "two hundred forty-three" as well as two hundreds, 4 tens, 3 ones.</p> <p>A document camera or interactive whiteboard can also be used to demonstrate "bundling" of objects. This gives students the opportunity to communicate their counting and thinking.</p>
<p><b>CC.2.NBT.3 READ and WRITE</b> numbers to 1000 using base-ten numerals, number names, and expanded form.</p>	<p>Students need many opportunities reading and writing numerals in multiple ways.  Examples:  • Base-ten numerals 637 (standard form)  • Number names six hundred thirty seven (written form)  • Expanded form <math>600 + 30 + 7</math> (expanded notation)</p> <p>When students say the expanded form, it may sound like this: "6 hundreds plus 3 tens plus 7 ones" OR 600 plus 30 plus 7."</p>
<p><b>CC.2.NBT.4 COMPARE</b> 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 <b>RECORD</b> the results of comparisons.</p>	<p>Students may use models, number lines, base ten blocks, interactive whiteboards, , written words, and/or spoken words that represent two three-digit numbers. To compare, students apply their understanding of place value. They first attend to the numeral in the hundreds place, then the numeral in tens place, then, if necessary, to the numeral in the ones place.</p>

## Grade 2 Mathematics

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Three digit numbers represent amounts of hundreds, tens, and ones (place value) <ul style="list-style-type: none"> <li>100 is equal to a bundle of ten 10's</li> <li>1000 is equal to ten bundles of 100</li> </ul>	UNDERSTAND (compose) numbers up to 1000 <ul style="list-style-type: none"> <li>Hundreds</li> <li>Tens</li> <li>Ones</li> </ul>	3
Numbers can be expressed in many ways		
Count(ing) <ul style="list-style-type: none"> <li>Within 1000</li> <li>By 5s, 10s, 100s</li> </ul>	READ and WRITE numbers to 1000 <ul style="list-style-type: none"> <li>Standard</li> <li>Written</li> <li>Expanded</li> </ul>	3
Compar(ing) numbers <ul style="list-style-type: none"> <li>place value</li> <li>Symbols <math>&lt; &gt; =</math></li> </ul>	COMPARE <ul style="list-style-type: none"> <li>Three-digit numbers</li> </ul>	2

Essential Questions	Big Ideas
How does place value help me in understanding the value of a number?	The place of a digit tells how many ones, tens hundreds, etc., are represented by that digit.
Why is it important to be able to rename numbers in several ways?	Sets of ten, one hundred, etc. is thought of as single entities when interpreting numbers using place value (e.g., 1 hundred is one group, it is 10 tens or 100 ones.) Numbers can be named in equivalent ways using place value (e.g., 2 hundreds 4 tens = 24 tens = 240)
How can I use place value to compare numbers?	Whole numbers can be compared by looking at corresponding place values.

## Grade 2 Mathematics

### Mathematical Practices UNIT 8

*Practices in bold are to be emphasized in the unit.*

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.**

#### Optional assessments:

- **Am I Ready?** (found at the beginning of the chapter 5– identifies foundational skills needed to be successful in this unit)
- **Curriculum-based assessment: Ledyard End of Unit 8 assessment** (found in Unit 8 appendix)

#### Learning Activities:

1. Students relate hundreds, tens and ones. MM 5-1
2. Students read, write and model numbers to 999. MM 5-2
3. Students identify and use words, models and expanded form to represent numbers to 999. MM 5-3
4. Students solve problems using the Logical Reasoning Strategy. MM 5-4
5. Students read and write numbers to 1,000. MM 5-5

#### *Additional activities:*

- Arrange benchmarks by 100s along a number line (number lines of 0-1,000). Give children cards with 3-digit numbers to place on the number line. There should be numerous whole class and individual opportunities for these activities.
6. Students find counting patterns. MM 5-6
  7. Students compare three-digit numbers using  $<$ ,  $>$ , and  $=$ . MM 5-7.

## Grade 2 Mathematics

### UNIT 8 VOCABULARY

equal to, expanded form, greater than, greatest, hundreds, least, less than, more than, most, not equal to, ones, place value, same as, tens, <, >, =

**Teacher note:** <http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx> - illustrated vocabulary cards

### Problem-solving strategies:

Make a List to solve problems (combination problem). MC 10-3

Act it Out or Draw a Picture MC 10-6

### Differentiated Instruction:

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

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

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

### Technology and Electronic Resources:

*SuccessMaker*

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

- [www.mathwire.com](http://www.mathwire.com)
- Resource for teachers to successfully implement CCSS. Includes lesson plans, resources and professional development opportunities.  
[www.ctcore.org](http://www.ctcore.org)

### 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.



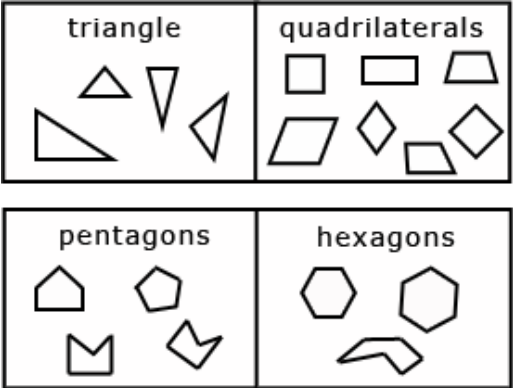

## Grade 2 Mathematics

### Unit of Study 9: Geometry / Partitioning

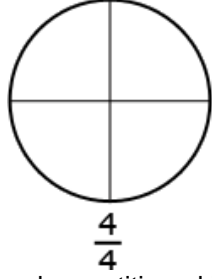


In this unit, students identify, describe and draw 2D figures and 3D cubes.

**Pacing:** 15 days + 5 days for reteaching/enrichment

#### DOMAIN and standards: Geometry

Priority and Supporting Common Core State Standards	Explanation and Examples
<p>The student will reason with shapes and their attributes.</p> <p><b>CC.2.G.1 RECOGNIZE and DRAW shapes having specified attributes, such as a given number of angles or a given number of equal faces. IDENTIFY triangles, quadrilaterals, pentagons, hexagons, and cubes. (Sizes are compared directly or visually, not compared by measuring.)</b></p>	<p>Students identify, describe, and draw triangles, quadrilaterals, pentagons, and hexagons. Pentagons, triangles, and hexagons should appear as both regular (equal sides and equal angles) and irregular. Students recognize all four sided shapes as quadrilaterals. Students use the vocabulary word “angle” in place of “corner” but they do not need to name angle types. Interactive whiteboards and document cameras may be used to help identify shapes and their attributes. Shapes should be presented in a variety of orientations and configurations.</p> <div style="text-align: center;">  </div> <p>This standard introduces fractions in an area model. Students need experiences with different sizes, circles, and rectangles. For example, students into three third of its describe into four fourth of described</p> <div style="text-align: center;">  <p><math>\frac{3}{3}</math></p> </div> <p>should recognize that when they cut a circle equal pieces, each piece will equal one original whole. In this case, students should the whole as three thirds. If a circle is cut equal pieces, each piece will equal one its original whole and the whole is as four fourths.</p> <p>Continued on next page:</p>
<p><b>CC.2.G.3 PARTITION circles and rectangles into two, three, or four equal shares, DESCRIBE the shares using the words halves, thirds, half of, a third of, 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.</b></p>	

## Grade 2 Mathematics

	 <p style="margin-top: 10px;">Students should see circles and rectangles partitioned in multiple ways so they learn to recognize that equal shares can be different shapes within the same whole. An interactive whiteboard may be used to show partitions of shapes</p> <div style="display: flex; justify-content: center; align-items: center; gap: 20px;"> <div style="text-align: center;"> <p>halves</p>  </div> <div style="text-align: center;"> <p>fourths</p>  </div> </div>
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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>Number of angles</li> <li>Number of equal faces</li> </ul>	RECOGNIZE (shapes by attributes)	4
Shapes	DRAW (shapes)	3
<ul style="list-style-type: none"> <li>Triangles</li> <li>Quadrilaterals</li> <li>Pentagons</li> <li>Hexagons</li> <li>Cubes</li> </ul>	IDENTIFY (shapes)	1, 2
Dividing shapes into equal pieces	PARTITION (circles, rectangles, squares)	3
<ul style="list-style-type: none"> <li>Circles</li> <li>Rectangles, squares</li> </ul>	DESCRIBE (shapes: halves, thirds, fourths/quarters)	1
Equal shares of identical wholes may have different shapes	DESCRIBE (whole as two halves, three thirds, etc.)	1
	RECOGNIZE (equal shares of same size whole can have different shapes)	1, 2

## Grade 2 Mathematics

Essential Questions	Big Ideas
How can I describe a geometric shape?	Polygons can be described uniquely by their sides and angles.
How can I divide circles and rectangles into 2, 3, or 4 equal parts?	A fraction describes the division of a whole into equal parts. A fraction is relative to the size of the whole.

### Mathematical Practices UNIT 9

*Practices in bold are to be emphasized in the unit.*

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.**

#### Optional assessments:

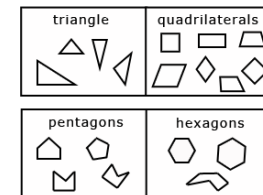
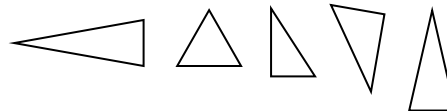
- **Am I Ready?** (found at the beginning of the chapter 12 – identifies foundational skills needed to be successful in this unit)
- **Curriculum-based assessment: Ledyard End of Unit 9 assessment** (found in Unit 9 appendix)

#### Learning Activities:

1. Students identify 2D geometric shapes. MM 12-1

##### Teacher notes:

- Reproduce the chart in the example on page 41 of this document, leaving out the geometric figures.
- As students learn about 2D figures, have them classify them by adding to the chart.
- Be sure students see different orientations and types of 2D shapes. For example: triangles:



## Grade 2 Mathematics

2. Students recognize attributes (sides, angles) of 2D shapes MM 12-2

*Additional activity:* Have the children draw a polygon and write the name on a page in their math journals. The children should then find pictures of objects that closely resemble the polygons they have drawn and named, and paste the pictures on the appropriate page of the journal. Children should explain the reason for pasting the picture on that page in writing. Magazines can be used to find pictures, such as stop signs that are octagons or rectangular candy bars.

3. Students solve problems using the Draw a Diagram strategy. MM 12-3

4. Students examine a cube and explain how it is different from the shapes they have studied. They describe the cube using the terms edges, corners (vertices) and faces. (A cube has 6 faces, all sides of a cube are the same length, a corner (vertex) is where 3 faces meet, a cube has 8 vertices, an edge is where 2 faces meet, a cube has 12 edges.)

**Teacher notes:**

- See Appendix for a net of a cube for students to cut out and fold. (<http://greatmathsgames.com/3d-shapes/item/38-3d-cube-net.html>)
- Students may build cubes from mini-marshmallows and toothpicks
- Students find cubes in their environment

5. Students revisit folding (partitioning) circles into halves, fourths and thirds. Students should describe a whole as two halves, three thirds, etc. using both words and numbers. (Ex.  $1 = \frac{3}{3}$ )

**Teacher note:** model dividing a circle into thirds by first finding the center of the circle. Beginning at the center, draw lines to the outer edge, have the thirds as equal as possible. Cut on the line to see how accurate the partitioning was. Students need practice partitioning circles into thirds.

6. Given 10 paper squares of the same size, students fold to show halves. Using a marker, trace the fold line and label each piece with  $\frac{1}{2}$  and one-half. Tape different ways to make one-half under the heading “one-half” on chart paper or the board.

- Repeat with thirds, and fourths
- Students should be able to explain in writing that equal shares of identical wholes may have different shapes.

6. Given 10 paper rectangles of the same size, students fold to show halves. Using a marker, trace the fold line. Tape different ways to make one-half under the heading “one-half” on chart paper or the board.

- Repeat with thirds, and fourths
- Students should be able to explain in writing that equal shares of identical wholes may have different shapes.

7. Students partition 2D shapes into 2, 3, and 4 equal shares. MM 12-7

## Grade 2 Mathematics

### UNIT 9 VOCABULARY

cube, congruent, equal parts, fourths, fraction, half (halves) hexagon, pentagon, polygon, quadrilateral, quarters, rectangle, rhombus, sort, square, thirds, trapezoid, triangle

**Teacher note:** <http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx> - illustrated vocabulary cards

### Differentiated Instruction:

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

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

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

### Technology and Electronic Resources:

*SuccessMaker*

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

- Illuminations: <http://illuminations.nctm.org/LessonsList.aspx?grade=1&standard=3&srchstr=tangrams> three lessons provided on: Recognizing, Constructing, and Identifying Triangles, Using Tangram Puzzles to Explore Spatial Relationships, and Developing Geometric Understanding and Spatial Visualization Skills
- Resource for teachers to successfully implement CCSS. Includes lesson plans, resources and professional development opportunities. [www.ctcore.org](http://www.ctcore.org)

## Grade 2 Mathematics

### Unit of Study 10: Measurement


In this unit, students estimate and measure length and area.

**Pacing: 15 days + 3 days for reteaching/enrichment**

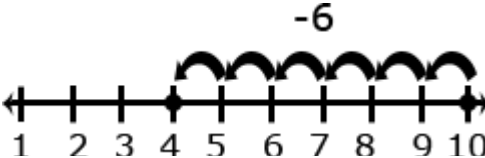
#### DOMAINS and standards: Measurement/Data and Geometry

Priority and Supporting Common Core State Standards	Explanation and Examples
<p>The student will measure and estimate lengths in standard units.</p> <p><b>CC.2.MD.1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.</b></p> <p><b>CC.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.</b></p>	<p>Students in second grade will build upon what they learned in first grade from measuring length with non-standard units to the new skill of measuring length in metric and U.S. Customary with standard units of measure. They should have many experiences measuring the length of objects with rulers, yardsticks, meter sticks, and tape measures. They will need to be taught how to actually use a ruler appropriately to measure the length of an object especially as to where to begin the measuring. Do you start at the end of the ruler or at the zero?</p> <p>Students need multiple opportunities to measure using different units of measure. They should not be limited to measuring within the same standard unit. Students should have access to tools, both U.S. Customary and metric. The more students work with a specific unit of measure, the better they become at choosing the appropriate tool when measuring.</p> <p>Students measure the length of the same object using different tools (ruler with inches, ruler with centimeters, a yardstick, or meter stick). This will help students learn which tool is more appropriate for measuring a given object. They describe the relationship between the size of the measurement unit and the number of units needed to measure something. For instance, a student might say, "The longer the unit, the fewer I need." Multiple opportunities to explore provide the foundation for relating metric units to customary units, as well as relating within customary (inches to feet to yards) and within metric (centimeters to meters).</p>

## Grade 2 Mathematics

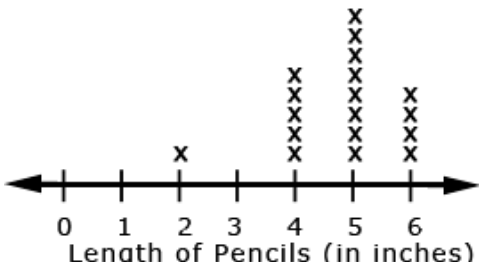
Priority and Supporting Common Core State Standards	Explanation and Examples
CC.2.MD.3. Estimate lengths using units of inches, feet, centimeters, and meters.	<p>Estimation helps develop familiarity with the specific unit of measure being used. To measure the length of a shoe, knowledge of an inch or a centimeter is important so that one can approximate the length in inches or centimeters. Students should begin practicing estimation with items which are familiar to them (length of desk, pencil, favorite book, etc.).</p> <p>Some useful benchmarks for measurement are:</p> <ul style="list-style-type: none"> <li>• First joint to the tip of a thumb is about an inch</li> <li>• Length from your elbow to your wrist is about a foot</li> <li>• If your arm is held out perpendicular to your body, the length from your nose to the tip of your fingers is about a yard</li> </ul>  <p>The illustration shows a person from the waist up, wearing a green shirt. They are holding their right arm straight out to the side, perpendicular to their body. A horizontal line with arrows at both ends extends from their nose to the tip of their right hand. Above this line, the text "1 yard" is written.</p>
CC.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.	<p>Second graders should be familiar enough with inches, feet, yards, centimeters, and meters to be able to compare the differences in lengths of two objects. They can make direct comparisons by measuring the difference in length between two objects by laying them side by side and selecting an appropriate standard length unit of measure. Students should use comparative phrases such as "It is longer by 2 inches" or "It is shorter by 5 centimeters" to describe the difference between two objects. An interactive whiteboard or document camera may be used to help students develop and demonstrate their thinking.</p>

# Grade 2 Mathematics

Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>The student will relate addition and subtraction to length.</b></p> <p>CC.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>Students need experience working with addition and subtraction to solve word problems which include measures of length. It is important that word problems stay within the same unit of measure. Counting on and/or counting back on a number line will help tie this concept to previous knowledge. Some representations students can use include drawings, rulers, pictures, and/or physical objects. An interactive whiteboard or document camera may be used to help students develop and demonstrate their thinking.</p> <p>Equations include:</p> <ul style="list-style-type: none"> <li>• <math>20 + 35 = c</math></li> <li>• <math>c - 20 = 35</math></li> <li>• <math>c - 35 = 20</math></li> <li>• <math>20 + b = 55</math></li> <li>• <math>35 + a = 55</math></li> <li>• <math>55 = a + 35</math></li> <li>• <math>55 = 20 + b</math></li> </ul> <p>Example:</p> <ul style="list-style-type: none"> <li>• A word problem for <math>5 - n = 2</math> could be: Mary is making a dress. She has 5 yards of fabric. She uses some of the fabric and has 2 yards left. How many yards did Mary use?</li> </ul>
<p>CC.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>Students represent their thinking when adding and subtracting within 100 by using a number line. An interactive whiteboard or document camera can be used to help students demonstrate their thinking.</p> <p>Example: <math>10 - 6 = 4</math></p> 



## Grade 2 Mathematics

Priority and Supporting Common Core State Standards	Explanation and Examples
<p><b>The student will represent and interpret data</b></p> <p>CC.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>This standard emphasizes representing data using a line plot. Students will use the measurement skills learned in earlier standards to measure objects. Line plots are first introduced in this grade level. A line plot can be thought of as plotting data on a number line. An interactive whiteboard may be used to create and/or model line plots.</p> <p style="text-align: center;"><b>Number of Pencils Measured</b></p> 

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Measurement	MEASURE (length)	1
• Length	SELECTING (tools)	3
Appropriate tools (such as)	USE (tools)	3
• Rulers		
• Yardsticks		
• Meter sticks	ESTIMATE (lengths)	3
• Measuring tapes		
Measurement (same object, different units)		
Relationship between unit size and measurement	MEASURE (length)	1
Length units	DESCRIBE	2
Different lengths		
Solve problems	USE (length units)	3
• length	SOLVE (problems involving length)	4

## Grade 2 Mathematics

Essential Questions	Big Ideas
Why is it important to measure using an appropriate tool?	Measurement involves a selected attribute of an object (length, area) and a comparison of the object being measured against a unit of the same attribute.
If I measure the length of an object using different size units, how do the measurements compare to each other?	The longer the unit of measure, the few units it takes to measure the object.
What can I use to help me estimate the length of an object?	Length can be estimated using appropriate know referents.
How can I use drawings and equations to solve problems about length?	Algorithms for operations with measures are similar to algorithms for rational numbers.

Mathematical Practices UNIT 10
<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><b>6. Attend to precision.</b></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>

### Optional assessments:

- **Am I Ready?** (found at the beginning of the chapter 11 – identifies foundational skills needed to be successful in this unit)
- **Curriculum-based assessment: Ledyard End of Unit 10 assessment** (found in Unit 10 appendix)

## Grade 2 Mathematics

### Learning Activities:

1. Students estimate and measure length using an inch ruler. MM 11-1

**Teacher note:**

- Have the children discover common referents for length in everyday objects by comparing them with measuring tools, such as from my thumb knuckle to the end of my thumb is about an inch, the width of a finger is about 1 centimeter, height from the floor to the knob on the door about 1 meter, etc.

2. Students measure objects in inches, feet and yards. MM 11-2

**Teacher note:** Have students describe the relationship among inch, foot and yard.

3. Students choose the appropriate customary tool and measure objects by length. MM 11-3

4. Students measure to compare customary lengths. MM 11-4

5. Students use measurement to relate inch, foot and yard. MM 11-5

7. Students solve problems using Logical Reasoning. MM 11-6

8. Students estimate and measure using a centimeter ruler and meter stick. MM 11-7

9. Students choose the appropriate metric tool and measure objects by length. MM 11-8

10. Students use measurement to compare metric lengths. MM 11-9

11. Students use measurement to relate centimeters and meters. MM 11-10

12. Students use a number line to measure objects. MM 11-11

13. Students explore measuring by not starting at 1. “Broken Ruler” activity (see appendix)

14. Students measure lengths to generate data shown on a line plot. MM 11-12

**Teacher note:** other suggestions for collecting measurement data for use with line plots might include student height in inches or centimeters, length of students’ feet in inches or centimeters, etc.

## Grade 2 Mathematics

### UNIT 10 VOCABULARY

centimeter, foot, half-inch, inch, length, line plot, meter, ruler, yard

**Teacher note:** <http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx> - illustrated vocabulary cards

### Differentiated Instruction:

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

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

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

### Technology and Electronic Resources:

*SuccessMaker*

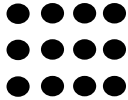
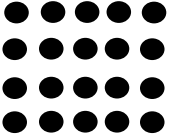
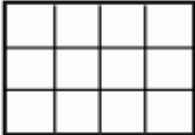
*Math Connects* online learning center for tools, activities and “learn more” experiences.

- Tour of Measurement: <http://www.mathforum.org>
- Can You Measure Up? <http://artsedge.kennedy-center.org/content/3801>
- Resource for teachers to successfully implement CCSS. Includes lesson plans, resources and professional development opportunities. [www.ctcore.org](http://www.ctcore.org)

## Grade 2 Mathematics

<b>Unit of Study 11: Addition, Subtraction and Multiplication</b> <span style="float: right;"><b>Pacing: 15 days</b></span>	
In this unit, students apply knowledge of addition and subtraction to solve two and three-digit numbers addition and subtraction problems.	
<b>DOMAINS and standards: Number and Operations in Base Ten and Operations and Algebraic Thinking</b>	
Priority and Supporting Common Core State Standards	Explanation and Examples
<b>The students will understand place value.</b> <b>CC.2.NBT.2. COUNT within 1000; skip-count by 5s, 10s, and 100s.</b>	
<b>The student will use place value understanding and properties of operations to add and subtract.</b> CC.2.NBT.6 ADD up to four two-digit numbers using strategies based on place value and properties of operations.  CC.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, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.	There is a strong connection between this standard and place value understanding with addition and subtraction of smaller numbers. Students may use concrete models or drawings to support their addition or subtraction of larger numbers. Strategies are similar to those stated in 2.NBT.5, as students extend their learning to include greater place values moving from tens to hundreds to thousands. Interactive whiteboards and document cameras may also be used to model and justify student thinking.
<b>CC.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.</b>	Students need many opportunities to practice mental math by adding and subtracting multiples of 10 and 100 up to 900 using different starting points. They can practice this by counting and thinking aloud, finding missing numbers in a sequence, and finding missing numbers on a number line or hundreds chart. Explorations should include looking for relevant patterns. Mental math strategies may include: <ul style="list-style-type: none"> <li>• counting on; 300, 400, 500, etc.</li> <li>• counting back; 550, 450, 350, etc.</li> </ul> Examples: <ul style="list-style-type: none"> <li>• 100 more than 653 is _____ (753)</li> <li>• 10 less than 87 is _____ (77)</li> <li>• “Start at 248. Count up by 10s until I tell you to stop.”</li> </ul>

## Grade 2 Mathematics

Priority and Supporting Common Core Standards	Examples and Explanations
<p>CC.2.NBT.9 EXPLAIN why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)</p> <p>The student will work with equal groups of objects to gain foundations for multiplication.</p> <p>CC.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> <p>The student will reason with shapes and their attributes.</p> <p>CC.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>Students may arrange any set of objects into a rectangular array. Objects can be cubes, buttons, counters, etc. Objects do not have to be square to make an array. Geoboards can also be used to demonstrate rectangular arrays. Students then write equations that represent the total as the sum of equal addends as shown below.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <math display="block">4 + 4 + 4 = 12</math> </div> <div style="text-align: center;">  <math display="block">5 + 5 + 5 + 5 = 20</math> </div> </div> <p>This standard is a precursor to learning about the area of a rectangle and using arrays for multiplication. An interactive whiteboard or manipulatives such as square tiles, cubes, or other square shaped objects can be used to help students partition rectangles. Rows are horizontal and columns are vertical.</p> <div style="text-align: center;">  </div>

## Grade 2 Mathematics

Concepts What Students Need to Know	Skills What Students Need To Be Able To Do	Bloom's Taxonomy Levels
Mentally add and subtract <ul style="list-style-type: none"> <li>10 or 100 to or from a number 100-900</li> </ul>	ADD AND SUBTRACT (mentally)	3
Strategies <ul style="list-style-type: none"> <li>Addition and subtraction</li> <li>Place value</li> <li>Properties of operations</li> </ul>	EXPLAIN (strategies) USE (place value, properties of operations)	5
Counting <ul style="list-style-type: none"> <li>Within 1000</li> <li>By 5s, 10s, 100s</li> </ul>	SKIP COUNT (by 5s, 10s, 100s)	3
Rectangle <ul style="list-style-type: none"> <li>Rows</li> <li>Columns</li> <li>Same size squares</li> </ul>	PARTITION	4
Total number of rows and columns	COUNT (to FIND)	3

Essential Questions	Big Ideas
What strategies can I use to add and subtract three-digit numbers?	Numbers can be broken apart and grouped in different ways to make calculations simpler.
How can I use mental math to add or subtract 10 or 100?	Number relationships can be used for mental calculations (10 more/less, 100 more /less

## Grade 2 Mathematics

### Mathematical Practices UNIT 11

*Practices in bold are to be emphasized in the unit.*

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.**

#### Optional assessments:

- **Am I Ready?** (found at the beginning of the chapter 6 – identifies foundational skills needed to be successful in this unit)
- **Curriculum-based assessment: Ledyard End of Unit 11 assessment** (found in Unit 11 appendix)

#### Learning Activities:

1. Students add four two-digit numbers MM 3-6
2. Students add numbers in the hundreds. MM 6-2
3. Students add 10 or 100 mentally. MM 6-3
4. Students regroup ones to add three-digit numbers. MM 6-4
5. Students regroup tens to add three-digit numbers. MM6-5
6. Students add three-digit numbers with regrouping. MM 6-6
7. Students rewrite a horizontal problem vertically then add. MM 6-7
8. Students subtract in the hundreds. MM 7-2
9. Students subtract 10 or 100 mentally. MM 7-3
10. Students regroup tens to subtract a three-digit number. MM 7-4
11. Students regroup hundreds to subtract a three-digit number. MM 7-5



## Grade 2 Mathematics

12. Students regroup three-digit numbers to subtract. MM 7-6
13. Students rewrite a horizontal problem vertically and subtract. MM 7-7
14. Students review using repeated addition to add equal groups. MM 2-4
15. Students use arrays with repeated addition MM 2-5
16. Students find area of a rectangle by partitioning and counting. MM 12-8

### UNIT 11 VOCABULARY

array, estimate, equal groups, hundreds, multiplication, ones, place value, product, regroup, round, tens

**Teacher note:** <http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx> - illustrated vocabulary cards

### Differentiated Instruction:

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

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

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

### Technology and Electronic Resources:

*SuccessMaker*

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

- [http://nlvm.usu.edu/en/nav/frames\\_asid\\_192\\_g\\_2\\_t\\_1.html](http://nlvm.usu.edu/en/nav/frames_asid_192_g_2_t_1.html) work with arrays for multiplication, interactive
- Resource for teachers to successfully implement CCSS. Includes lesson plans, resources and professional development opportunities. [www.ctcore.org](http://www.ctcore.org)

Domain: Operations and Algebraic Thinking		
Grade 1	Grade 2	Grade 3
<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>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>	<p><b><u>Represent and solve problems involving multiplication and division.</u></b></p> <p>3.OA.1: Interpret products of whole numbers, e.g., interpret <math>5 \times 7</math> as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as <math>5 \times 7</math>.</p> <p>3.OA.2: Interpret whole-number quotients of whole numbers, e.g., interpret <math>56 \div 8</math> as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. <i>For example, describe a context in which a number of shares or a number of groups can be expressed as <math>56 \div 8</math>.</i></p> <p>3.OA.3: Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (Note: See Glossary, Table 2.)</p> <p>3.OA.4: Determine the unknown whole number in a multiplication or division equation relating three whole numbers. <i>For example, determine the unknown number that makes the equation true in each of the equations <math>8 \times ? = 48</math>, <math>5 = ? \div 3</math>, <math>6 \times 6 = ?</math></i></p> <p><b><u>Understand properties of multiplication and the relationship between multiplication and division.</u></b></p> <p>3.OA.5: Apply properties of operations as strategies to multiply and divide. (Note: Students need not use formal terms for these properties.) <i>Examples: If <math>6 \times 4 = 24</math> is known, then <math>4 \times 6 = 24</math> is also known. (Commutative property of multiplication.) <math>3 \times 5 \times 2</math> can be found by <math>3 \times 5 = 15</math>, then <math>15 \times 2 = 30</math>, or by <math>5 \times 2 = 10</math>, then <math>3 \times 10 = 30</math>. (Associative property of multiplication.) Knowing that <math>8 \times 5 = 40</math> and <math>8 \times 2 = 16</math>, one can find <math>8 \times 7</math> as <math>8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56</math>. (Distributive property.)</i></p> <p>3.OA.6: Understand division as an unknown-factor problem. <i>For example, find <math>32 \div 8</math> by finding the number that makes 32 when multiplied by 8.</i></p> <p><b><u>Multiply and divide within 100.</u></b></p>

## Grade 2 Mathematics

<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.</p> <p><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>3.OA.7: Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that <math>8 \times 5 = 40</math>, one knows <math>40 \div 5 = 8</math>) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.</p> <p><b><u>Solve problems involving the four operations, and identify and explain patterns in arithmetic.</u></b></p> <p>3.OA.8: Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Note: This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order – Order of Operations.)</p> <p>3.OA.9: Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. <i>For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.</i></p>
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Domain: Number and Operations in Base Ten		
Grade 1	Grade 2	Grade 3
<p><b><u>Extend the counting sequence.</u></b>  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>  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:  a. 10 can be thought of as a bundle of ten ones – called a “ten.”  b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.  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).  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>  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.  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.  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>  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:  a. 100 can be thought of as a bundle of ten tens – called a “hundred.”  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).  2.NBT.2: Count within 1000; skip-count by 5s, 10s, and 100s.  2.NBT.3: Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.  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>  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.  2.NBT.6: Add up to four two-digit numbers using strategies based on place value and properties of operations.  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, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.  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.  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>	<p><b><u>Use place value understanding and properties of operations to perform multi-digit arithmetic.</u></b> <i>(Note: A range of algorithms may be used.)</i>  3.NBT.1: Use place value understanding to round whole numbers to the nearest 10 or 100.  3.NBT.2: Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.  3.NBT.3: Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g. <math>9 \times 80</math>, <math>5 \times 60</math>) using strategies based on place value and properties of operations.</p>

## Grade 2 Mathematics

Domain: Number and Operations - Fractions		
Grade 1	Grade 2	Grade 3
None	None	<p><i>Note: Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6 and 8.</i></p> <p><b>Develop understanding of fractions as numbers.</b></p> <p>3.NF.1: Understand a fraction <math>\frac{1}{b}</math> as the quantity formed by 1 part when a whole is partitioned into <math>b</math> equal parts; understand a fraction <math>\frac{a}{b}</math> as the quantity formed by <math>a</math> parts of size <math>\frac{1}{b}</math>.</p> <p>3.NF.2: Understand a fraction as a number on the number line; represent fractions on a number line diagram.</p> <p>a. Represent a fraction <math>\frac{1}{b}</math> on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into <math>b</math> equal parts. Recognize that each part has size <math>\frac{1}{b}</math> and that the end-point of the part based at 0 locates the number <math>\frac{1}{b}</math> on the number line.</p> <p>b. Represent a fraction <math>\frac{a}{b}</math> on a number line diagram by marking off <math>a</math> lengths <math>\frac{1}{b}</math> from 0. Recognize that the resulting interval has size <math>\frac{a}{b}</math> and that its endpoint locates the number <math>\frac{a}{b}</math> on the number line.</p> <p>3.NF.3: Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.</p> <p>a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.</p> <p>b. Recognize and generate simple equivalent fractions, e.g., <math>\frac{1}{2} = \frac{2}{4}</math>, <math>\frac{4}{6} = \frac{2}{3}</math>. Explain why the fractions are equivalent, e.g., by using a visual fraction model.</p> <p>c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. <i>Examples: Express 3 in the form <math>3 = \frac{3}{1}</math>; recognize that <math>\frac{6}{1} = 6</math>; locate <math>\frac{4}{4}</math> and 1 at the same point of a number line diagram.</i></p> <p>Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols <math>&gt;</math>, <math>=</math>, or <math>&lt;</math>, and justify the conclusions, e.g., by using a visual fraction model.</p>

## Domain: Measurement and Data

## Grade 2 Mathematics

Grade 1	Grade 2	Grade 3
<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 in 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.</p> <p><b><u>Relate addition and subtraction to length.</u></b></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</p>	<p><b><u>Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.</u></b></p> <p>3.MD.1: Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.</p> <p>3.MD.2: Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). (Note: Excludes compound units such as cm<sup>3</sup> and finding the geometric volume of a container.) Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Note: Excludes multiplicative comparison problems – problems involving notions of “times as much”; see Glossary, Table 2.)</p> <p><b><u>Represent and interpret data.</u></b></p> <p>3.MD.3: Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. <i>For example, draw a bar graph in which each square in the bar graph might represent 5 pets.</i></p> <p>3.MD.4: Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units – whole numbers, halves, or quarters.</p> <p><b><u>Geometric measurement: understand concepts of area and relate area to multiplication and to addition.</u></b></p> <p>3.MD.5: Recognize area as an attribute of plane figures and understand concepts of area measurement.</p> <p>a. A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area.</p> <p>b. A plane figure which can be covered without gaps or overlaps by <math>n</math> unit squares is said to have an area of <math>n</math> square units.</p> <p>3.MD.6: Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).</p>

## Grade 2 Mathematics

	<p>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>	<p>3.MD.7: Relate area to the operations of multiplication and addition.</p> <p>a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.</p> <p>b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.</p> <p>c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths <math>a</math> and <math>b + c</math> is the sum of <math>a \times b</math> and <math>a \times c</math>. Use area models to represent the distributive property in mathematical reasoning.</p> <p>d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.</p> <p><b><u>Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.</u></b></p> <p>3.MD.8: Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.</p>
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## Grade 2 Mathematics

Domain: Geometry		
Grade 1	Grade 2	Grade 3
<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><b><u>Reason with shapes and their attributes.</u></b></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>	<p><b><u>Reason with shapes and their attributes.</u></b></p> <p>3.G.1: Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.</p> <p>3.G.2: Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. <i>For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.</i></p>