



San Diego Unified School District

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Instructional Module to Enhance the Teaching of

HARCOURT

**Math**

California Edition

**Grade 3**

**Module 3 -Revised**

UNDERSTAND NUMBERS AND OPERATIONS

— WORK IN PROGRESS —

**MODIFIED**

**San Diego City Schools**  
Instruction and Curriculum Division

**GRADE 3 – MATHEMATICS CURRICULUM MAP**

**MODULE 3 – UNDERSTANDING NUMBERS AND OPERATIONS**  
Modules represent individual units of study that lead to essential learnings

**THREADS THROUGHOUT THE YEAR:**

*The threads represent ongoing learning opportunities in which students should be actively engaged throughout all units of inquiry during the entire school year. These items should not be isolated to any one particular unit of inquiry.*

**Students will:**

- Develop understanding of numbers and the number system and use their understanding to solve problems and recognize reasonable results.
- Develop understanding of and fluency in basic computation and procedural skills.
- Use mathematical reasoning to solve problems.
- Communicate their mathematical thinking by using words, numbers, symbols, graphs and charts.
- Use equations and variables to express generalizations of patterns and relationships.
- Develop logical thinking to analyze evidence and build arguments to support or refute a hypothesis.
- Make connections among mathematical ideas and between other disciplines.
- Develop and use strategies, skills, and concepts to solve problems.
- Use appropriate tools, including technology, as vehicles to learn mathematical concepts.

**These are essential learnings that represent bigger ideas/concepts:**

- Students translate between different representations of mathematical solutions and situations.
- Students understand that the position of digits in numbers determines the value of the digits.
- Students understand that the positions of digits in numbers are related by a pattern involving powers of ten.
- Students understand that numbers can be taken apart by place value and in different ways.
- Students estimate using compatible numbers.
- Students understand large numbers in relation to benchmark numbers and familiar contexts.

**These are essential questions that learners ask themselves in order to achieve the essential learnings:**

- *\*How do I use the number line as a tool for combining and finding the difference between numbers?*
- How do I compare the relationships of numbers using base-ten materials\*, number lines\*, and place value charts\*\*?
- *\*How do I find the value of a digit by using its place-value position?*
- How do I use concrete and pictorial models to represent numbers through the thousands?
- How do I connect equivalent representations using place value charts, base-ten materials, expanded notation, and standard notation?
- How do I read, write, and identify the value of digits in numbers through 10,000?
- How does my understanding of place value help me to develop strategies to order and compare numbers through 10,000?
- What are strategies I can explain and use for rounding numbers to ten thousand?
- How do I use benchmark numbers to help develop the ability to estimate and understand the relative magnitude of numbers?
- How do I use the Associative Property\* of addition to add 2- and 3-digit numbers?
- *\*How do I use concrete materials to solve addition and subtraction problems requiring regrouping and represent the solutions symbolically?*
- How do I write expressions that represent situations involving addition and subtraction?
- How do I select operational symbols to make number sentences true involving addition and subtraction?
- How can I use the strategy of “breaking apart”, making combinations of ten and using numbers in expanded form to add and subtract?
- How do I estimate the sum of and the difference between two numbers and to check the reasonableness of an answer?
- What are strategies I can explain and use for rounding numbers to ten thousand?
- How can my understanding of place value help me develop strategies to order and compare numbers through ten thousand?

**\* Presented in previous grades**

**Resources:** Van de Walle: Chapters 12 & 13 (pp. 178-199 & 201-225); Mathematics Source Book: Number & Addition and Subtraction (pp. 7-26)

## ADDITION and SUBTRACTION

### Key Concepts

- Addition is used to combine two or more quantities.
- Addition is used to show a change or increase from a starting amount
- Subtraction is used to take away from, take apart, or decrease from, a quantity.
- Subtraction is used to compare two quantities or to show difference between two quantities.
- Addition or subtraction can be used to solve missing addend situations.

### Tips for Learning Multi-digit Addition and Subtraction

- *Have students mentally add or subtract to strengthen place value understanding and computation flexibility. As students solve many problems have them:*

*Combine tens and combine ones:*  $53 + 44$  can be solved by adding  $50 + 40$  to get 90, adding  $3 + 4$  to get 7, and then adding  $90 + 7$  for a sum of 97.

*Count up by tens and then by ones:*  $53 + 44$  can be solved by counting up "53, 63, 73, 83, 93:  $93 + 4$  is 97." Or, " $53 + 40$  is 93;  $93 + 4$  is 97." The difference  $100 - 88$  could be found by counting up "88, 98, 99, 100, that's 12."

*Use derived facts:* If you know  $8 + 8$  is 16, you know " $8 + 9$  is 17 because it's one more." Similarly, if you know  $25 + 25$  is 50, you know " $25 + 27$  is 52 because it's just 2 more." Also, if you know  $3 + 5$  is 8 you know " $30 + 50$  is 80."

*Use compensation to change to simpler numbers:*  $42 + 29$  can be changed to  $41 + 30$  by decreasing 42 by 1 and increasing 29 by 1. Similarly,  $33 - 18$  can be changed to a simpler problem with an equal difference ( $35 - 20$ ) by adding 2 to each number.

*Break apart numbers (decompose and recombine):*  $28 + 6$  can be solved by thinking "28 and 2 more would be 30," then breaking 6 into  $2 + 4$  and finally thinking "30 and 4 more is 34."

*Count on, as in making change:*  $75¢ - 58¢$  can be thought of as "58 and 2 more makes 60¢, and 15 more is 75¢. So, 75¢ is 2 more and 15 more, or 17¢ more, than 58¢.

More tips on page 23 – 26 of [A Mathematics Source Book for Elementary and Middle School Teachers](#), A Report by Bay Area Mathematics Task Force: Arena Press: (800) 422-7249 (for additional copies of this document)

**UNDERSTAND NUMBERS AND OPERATIONS**  
**5 Weeks of Instruction (25 days) – Unit 1**

<p><b>Day 1:</b>  <b>Chapter 1: Place Value and Number Sense</b>  Lesson 1.2  Understand Place Value</p>	<p><b>Day 2:</b>  Lesson 1.3  (Day 1 of 2)    Understand Numbers to 10,000</p>	<p><b>Day 3:</b>  Lesson 1.3  (Day 2 of 2)    Understand Numbers to 10,000</p>	<p><b>Day 4:</b>  Lesson 1.4  (Day 1 of 2)    Understand 10,000</p>	<p><b>Day 5:</b>  Lesson 1.4  (Day 2 of 2)    Understand 10,000</p>
<p><b>Day 6:</b>  <b>Chapter 2; Compare, Order and Round Numbers</b>    Lesson 2.1  Size of Numbers</p>	<p><b>Day 7:</b>  Lesson 2.2  (Day 1 of 2)    Compare Numbers</p>	<p><b>Day 8:</b>  Lesson 2.2  (Day 2 of 2)    Compare Numbers</p>	<p><b>Day 9:</b>  Lesson 2.3 &amp; 2.4  (combined)    Order Numbers and Problem Solving</p>	<p><b>Day 10:</b>  Lesson 2.5 &amp; 2.6  (Day 1 or 2; combined)    Round to Nearest 10, 100, 1000</p>
<p><b>Day 11:</b>    Lesson 2.5 &amp; 2.6  (Day 2 of 2)    Rounding Numbers Using Number Lines</p>	<p><b>Day 12:</b>  <b>Chapter 3 &amp; 4 Combined: Addition and Subtraction</b>    Lesson 3.1  Using the Associative Property to Add</p>	<p><b>Day 13:</b>  Lesson 4.6  (Day 1 of 2)    Algebra: Expressions &amp; Number Sentences</p>	<p><b>Day 14:</b>  Lesson 4.6  (Day 2 of 2)    Algebra: Expressions &amp; Number Sentences</p>	<p><b>Day 15:</b>    Lesson 3.2 &amp; 4.1    Estimate Sums and Differences</p>
<p><b>Day 16:</b>    Lesson 3.3-4.6    Adding and Subtracting Multi-digit Numbers</p>	<p><b>Day 17:</b>    Lesson 3.3-4.6    Adding and Subtracting Multi-digit Numbers</p>	<p><b>Day 18:</b>    Lesson 3.3-4.6    Adding and Subtracting Multi-digit Numbers</p>	<p><b>Day 19:</b>    Lesson 3.3-4.6    Adding and Subtracting Multi-digit Numbers</p>	<p><b>Day 20:</b>    Lesson 3.3-4.6    Adding and Subtracting Multi-digit Numbers</p>
<p><b>Day 21</b>    Lesson 4.4    Subtract Across Zeros</p>	<p><b>Day 22:</b>    Lesson 3.3-4.6    Adding and Subtracting of Multi-digit Numbers</p>	<p><b>Day 23:</b>    <b>Unit Review</b></p>	<p><b>Day 24:</b></p>	<p><b>Day 25:</b></p>

# Unit 1: Understand Number and Operations

## MODULE 3 NOTES

- Lessons from chapter 3 & 4 have been combined because addition and subtraction are related and should not be taught in isolation. Combining addition and subtraction also makes each lesson more problematic. Furthermore, addition and subtraction have been taught in previous grades. By combining addition and subtraction problems in each lesson, students will have to make decisions about what operations to use, make meaning of the operations and they will also get opportunities to make connections and see relationships between the operations.
- On days 13 and 14, lesson 4.6 (Algebra: Expressions & Number Sentences) will be taught prior to the lessons on addition and subtraction of multi-digit numbers. The essential questions from these two lessons are threaded throughout the lessons on adding and subtracting multi-digit numbers to help solidify these important ideas. The essential questions from day 13 and 14 are: *How do I write expressions that represent situations? How do I select operational symbols to make number sentences true?*
- The essential question from day 15, lesson 3.2 & 4.1 (Estimate Sums and Differences) is embedded throughout all lessons on adding and subtracting multi-digit numbers. The essential question, *How do I estimate the sum and difference between two numbers and to check the reasonableness of an answer?*, should be included throughout the year when calculating numbers.

DAY: 1

Unit 1: UNDERSTANDING NUMBERS AND OPERATIONS  
 Chapter 1: Place Value and Number Sense  
 LESSON 1.2, pp. 4-5

<p><b>MATERIALS:</b></p>	<p>Base-ten materials – 1 bag of units, rods &amp; flats for 2 students, graph paper (TR 57) 1 piece per child, place value chart (1 per partnership TR11)</p>
<p><b>LESSON FOCUS:</b></p>	<p><b>Understand Place Value</b></p>
<p><b>CALIFORNIA STANDARDS:</b></p>	<p><b>Number Sense:</b>  <b>1.0:</b> Understand place value of whole numbers.  <b>1.3:</b> Identify place value for each digit in numbers to 10,000.  <b>1.5:</b> Use expanded notation to represent numbers.  <b>Mathematical Reasoning:</b> (standards are embedded)</p>
<p><b>PURPOSE OF LESSON:</b></p>	<ul style="list-style-type: none"> <li>• How do I find the value of a digit by using its place-value position?</li> <li>• How do I connect equivalent representations using place value charts, base-ten materials, expanded notation, and standard notation?</li> </ul>
<p><b>LAUNCH:</b>                  Materials: base-ten blocks, graph paper for pictorial representations of base-ten blocks.</p>	<p>Ask students to use base-ten blocks to represent the number 248.                  Questions:</p> <ul style="list-style-type: none"> <li>• What does each of the blocks represent?</li> <li>• Is there another way to write the number 248? (e.g., <math>200 + 40 + 8</math>, <math>200 + 30 + 10 + 8</math>, two hundred forty-eight) <i>Have students discuss with a partner and then share out answers to whole group.</i></li> </ul> <p>SCAFFOLD: Begin with a 2-digit number, then move to a 3-digit number.</p> <p>Note: The purpose of this LAUNCH is to help students connect equivalent representations using base ten materials, expanded notation, and standard notation. It is important to highlight the following vocabulary during this discussion: digit, expanded notation, standard notation, and word form.</p>
<p><b>EXPLORE:</b>                  Materials: base-ten blocks, graph paper (TR 57), pencils, large pieces of paper, place value charts (1 per partnership; TR11)</p>	<p>Chart the following problem:  <b>Represent 365 in as many different ways as you can, with materials and numbers.</b> (<i>Have students work with partners or small groups.</i>)</p> <p>When conferring with small groups keep in mind the following:</p> <ul style="list-style-type: none"> <li>• Students should represent the possible answers using blocks, words, standard notation, expanded notation.</li> <li>• Students should be able to explain how each block represents the appropriate digit in the number.</li> <li>• Variety is important. (e.g., <math>300 + 60 + 5</math>, three hundred sixty-five, 365)</li> <li>• Are students using strategies that take advantage of place value? (i.e., place value charts, graph paper to make pictorial representations of the base-ten system, base-ten blocks).</li> </ul>

	<p>Guiding Questions while conferring with groups:</p> <ul style="list-style-type: none"> <li>• How does the base-ten representation connect to standard form/expanded form?</li> <li>• Have you found all the possibilities? How do you know?</li> <li>• How does this relate to the problem we did in the launch?</li> <li>• What do you know about the number 365?</li> <li>• How would you show your number on a place value chart?</li> <li>• CHALLENGE: Using base-ten blocks, how can you show the number 365 without using the hundreds blocks?</li> </ul> <p>Extension: Continue with other numbers. Students may choose these numbers. Have students choose numbers with 4 digits.</p>
<p><b>SUMMARIZE:</b></p>	<p>Revisit the Essential Questions:</p> <ul style="list-style-type: none"> <li>• <i>How do I find the value of a digit by using its place-value position?</i></li> <li>• <i>How do I connect equivalent representations using place value charts, base-ten materials, expanded notation, and standard notation?</i></li> </ul> <p><i>NOTE: Be purposeful about the students you select to share out. How will the students you select to share out move the class closer to meeting the math goals for this lesson? Is there a student that would extend/advance the class's thinking?</i></p> <p>Ask selected partnerships or small groups to explain to the class what their strategies were for representing the number 365.</p> <p>Guiding Questions:</p> <ul style="list-style-type: none"> <li>• What does your group know about the number 365?</li> <li>• How did you decide to break up the number?</li> <li>• What strategies did you use to solve the problem?</li> <li>• How does the base-ten representation connect to standard form/expanded form?</li> <li>• How would you show your number on a place value chart?</li> <li>• How do you know the value of each digit?</li> <li>• How does this problem relate to the problem we did in the launch?</li> </ul>
<p><b>PRACTICE/ HOMEWORK:</b></p>	<p>Represent 492 in as many different ways as you can, with materials and numbers.</p>

DAY: 2

Unit 1: UNDERSTAND NUMBERS AND OPERATIONS

Chapter 1: Place Value and Number Sense

LESSON 1.3, pp. 6-7

<b>MATERIALS:</b>	One-centimeter graph paper (TR57 3-4 sheets per pair), scissors, glue or tape, crayons or markers, base-ten blocks, coins, 100 charts (TR15), calculators
<b>LESSON FOCUS:</b>	<b>Understand Numbers to 10,000</b>
<b>CALIFORNIA STANDARDS:</b>	<p><b>Number Sense:</b></p> <p><b>1.0:</b> Understand the place value of whole numbers</p> <p><b>1.1:</b> Count read and write whole numbers to 10,000.</p> <p><b>1.5:</b> Use expanded notation to represent numbers.</p> <p><b>Mathematical Reasoning:</b> (standards are embedded)</p>
<b>PURPOSE OF LESSON/ESSENTIAL QUESTIONS:</b>	<ul style="list-style-type: none"> <li>• How do I use concrete and pictorial models to represent numbers through the thousands?</li> </ul>
<p><b>LAUNCH:</b>  <b>PAIR – SHARE</b>          (Have kids partner talk during discussion and then share out responses to full class.)</p>	<p>Today we are going to be investigating the number 1000.</p> <ul style="list-style-type: none"> <li>• How big do you think a thousand is? (PAIR – SHARE)</li> <li>• How big would a box have to be to put 1000 pencils in it? (PAIR – SHARE)</li> <li>• How many classes of 3<sup>rd</sup> graders would we need to make 1000 students? (PAIR- SHARE)</li> <li>• What are some different ways we could count to 1000? (chart responses; e.g., by 10's, by 50's, by 100's)</li> <li>• Do you think counting by 1's is the best way to count to 1000? Why?</li> </ul> <p><b>MATHEMATICAL NOTE:</b> <i>Base ten number knowledge results from an ability to count, make groupings, and to understand place value at a deeper level than simply naming places.</i></p>
<p><b>EXPLORE:</b>          One-centimeter graph paper (TR57, 3-4 sheets per pair), scissors, glue or tape, crayons or markers, base-ten blocks, coins, 100 charts(TR15), calculators, chart paper (1 piece per group)</p>	<p>Over the next two days we are going to make a picture of 1000 on this chart paper. You and your partner have to figure out how to represent 1000 with one-centimeter squares. You will have to keep track of how many equal groups are needed to make 1000. You also must organize and label the groups clearly so you can convince someone else that there are exactly 1000 squares on your chart.</p> <ul style="list-style-type: none"> <li>• Pairs of students must cut out from the one-centimeter graph paper exactly 1000 squares and glue or tape them to the large sheet of poster or chart paper, to make a 1000 chart.</li> <li>• They must keep track of how many groups are needed to make 1000.</li> <li>• They must organize and label groups clearly so that any number on the 1000 chart can be located easily. For example, some students may start grouping by 25 and labeling each group of 25 squares with 25, 25, 25...instead of 25, 50, 75...Make sure they understand that they are to label each block of squares with the total so far, not just with the number they are counting by</li> <li>• Let students figure out for themselves how to arrange their blocks of squares on the large paper.</li> <li>• Remind them that they must arrange the squares so that someone looking at their chart could easily count the groups. They should be able to convince someone else that there are exactly 1000 squares</li> </ul>

	<p>on their chart when it is finished.</p> <p><b>NOTE:</b> Some kids will choose to group by 1's, 2's or 5's to make a picture of 1000. They will get frustrated with this tedious task; you can ask guiding questions so they can come up with more efficient groupings.</p> <p>Circulate as students are working, asking questions that will push them to think mathematically about the process they are following.</p> <p>Guiding questions to ask while conferring:</p> <ul style="list-style-type: none"> <li>• How did you decide to show 1000?</li> <li>• How many squares do you have?</li> <li>• About how many more do you need?</li> <li>• What groupings did you choose to use? Why?</li> <li>• About how many more groups do you need to make 1000?</li> <li>• How are you keeping track of how many groups you need to make 1000?</li> </ul> <p><i>During the Explore, you should be listening in on conversations and then have some pairs share out during the summary. Be purposeful about the students you select to share out. How will the students you select to share out move the class closer to meeting the math goals for this lesson? Is there a student that would extend/advance the class's thinking? (e. g., partners that used the following groupings: 20, 25, 50, 100 – these grouping are efficient in building 1000)</i></p>
<p><b>SUMMARIZE:</b> Connect purpose to activities.</p>	<p>Revisit essential question: <i>How do I use concrete and pictorial models to represent numbers through the thousands?</i></p> <p>Have purposefully selected teams explain their strategies in making their 1000 chart. They will not be finished.</p> <p><b>Guiding Questions/Statements:</b></p> <ul style="list-style-type: none"> <li>• How did you get started in making your 1000 chart?</li> <li>• Explain how you organized your chart.</li> <li>• Have you run into any problems while constructing your chart? Explain.</li> <li>• How did you keep track of how many groups were needed to make 1000?</li> <li>• Would you do anything different in creating your chart? Explain?</li> <li>• What are your plans to finish the chart?</li> </ul>
<p><b>PRACTICE/ HOMEWORK</b></p> <p><b>14 note cards</b></p>	<p>Alternative Teacher Strategy, TE page 6B.</p>

DAY: 3  
 Unit 1: UNDERSTAND NUMBERS AND OPERATIONS  
 Chapter 1: Place Value and Number Sense  
 LESSON 1.3: Day 2

<b>MATERIALS:</b>	Place value chart for recording on overhead/board, one-centimeter graph paper (TR57 3-4 sheets per pair), scissors, glue or tape, crayons or markers, base-ten blocks, coins, 100 charts (TR15), calculators, , (early finishers: post-its, 10 envelopes)
<b>LESSON FOCUS:</b>	<b>Understand Numbers to 10,000</b>
<b>CALIFORNIA STANDARDS:</b>	<p><b>Number Sense: 1.3</b></p> <p>1.0: Understand the place value of whole numbers.                  1.1: Count read and write whole numbers to 10,000.                  1.3: Identify the place value for each digit in numbers to 10,000.                  1.5: Use expanded notation to represent numbers.  <b>Mathematical Reasoning:</b> (standards are embedded)</p>
<b>PURPOSE OF LESSON:</b>	<ul style="list-style-type: none"> <li>• How do I use concrete and pictorial models to represent numbers through the thousands?</li> </ul>
<p><b>LAUNCH:</b>                  Introduce students to concepts.</p>	<p>We have been investigating 1000 by constructing a thousand chart and doing some homework that dealt with 1000.</p> <ul style="list-style-type: none"> <li>• What have you learned about the number 1000? (chart students responses)</li> <li>• What is your plan for finishing your 1000 chart? Talk to your partner.</li> </ul> <p>You should be listening in on conversations and then have some pairs share out. Be purposeful about the students you select to share out. How will the students you select to share out move the class closer to meeting the math goals for this lesson? Is there a student that would extend/advance the class's thinking?</p>
<p><b>EXPLORE:</b>                  Same materials as day 1</p> <p>Early Finishers: slips of paper, 10 envelopes</p>	<p>Have students continue to construct 1000 charts. Remind students to label their groupings; they should be able to convince someone else that there are exactly 1000 squares on their chart when it is finished.</p> <p>Guiding questions to ask while conferring:</p> <ul style="list-style-type: none"> <li>• How did you decide to show 1000?</li> <li>• How many squares do you have?</li> <li>• About how many more do you need?</li> <li>• What groupings did you choose to use? Why?</li> <li>• About how many more groups do you need to make 1000?</li> <li>• How are you keeping track of how many groups you need to make 1000?</li> </ul> <p><i>(During the explore, you should be listening in on conversations and then have some pairs share out during the summary. Be purposeful about the students you select to share out. How will the students you select to share out move the class closer to meeting the math goals for this lesson? Is there a student that would extend/advance the class's thinking? )</i></p> <p><b>EARLY FINISHERS:</b> If some students finish early, have them write 10-15 numbers between 1-1000 on individual slips of paper. Place slips of paper in envelopes. They can challenge each other to locate the particular numbers they pull from the</p>

