SD USD

San Diego Unified School District

Instructional Module to Enhance the Teaching of

HARCOURT

Math

California Edition

Grade 2

Module 6 - Revised

Two-Digit Addition and Subtraction

- WORK IN PROGRESS -

MODULE 6 – TWO-DIGIT ADDITION AND SUBTRACTION

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.
- 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 estimate, calculate, and solve problems involving addition and subtraction of two-digit numbers using meaningful strategies.
- Students use what they know about place value to develop flexible ways of computation.
- Students take apart and recombine numbers to make tens while finding sums/differences of two-digit numbers.
- Students recognize that some strategies work best for specific problems.
- Students use their understanding of tens and ones to solve problems using mental math.
- Students model, represent and interpret number relationships (e.g., the inverse relationship between addition and subtraction) to create and solve problems using addition and subtraction.

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

- How can I use a hundred chart to see relationships when counting on and back by tens and ones?
- *How do I model and record problems involving addition and subtraction?**
- *What strategies do I use when solving addition and subtraction problems? **
- How can I use the inverse relationship between addition and subtraction to solve problems?
- How does my understanding of using or making tens help to solve mental math problems for addition and subtraction?
- How do I use symbolic notation to describe word problems?
- How do I make decisions on which addition/subtraction strategy to use?

*Presented in previous grades.

Resources: *Van de Walle, Chapter 13, pp. 201-214; K. Richardson, Two–Digit Addition and Subtraction,* Mathmematics Source Book, *pp 14-26*

20 DAYS

Key Mathematical Concepts:

- Count on
- Add tens
- Add one- and two-digit numbers
- Estimate sums
- Use mental math
- To tell time
- Solve a problem by using an appropriate strategy

Chapter 14 Explore Two-Digit Subtraction	**Chapter 15 Two-Digit Subtraction**
Lesson 14.1: Subtract Tens Lesson 14.2: Mental Math: Count Tens and Ones Lesson 14.3: Tens and Ones Lesson 14.4: Two-Digit Subtraction Lesson 14.5: Two-Digit Subtraction	Lesson 15.1: Problems with Two-Digit Numbers Lesson 15.2: Problems with Two-Digit Numbers Lesson 15.3: Problems with Two-Digit Numbers Lesson 15.4: Problem Solving Lesson 15.5: Addition and Subtraction
Chapter 16 Practice Two-Digit Subtraction	
Lesson 16.1: Mental Math Lesson 16.2: Addition and Subtraction Lesson 16.3: Addition and Subtraction Lesson 16.4: Problem Solving Practice: Problem Solving Practice: Problem Solving Practice: Problem Solving Practice: Problem Solving Practice: Problem Solving Assessment	

Harcourt Math: Grade 2
Module 6: Two-Digit Addition and Subtraction
20 Days

Module 6 Day 1 Unit 3 Lesson 14.1	**Module 6 Day 2** Unit 3 Lesson 14.2	**Module 6 Day 3** Unit 3 Lesson 14.3	**Module 6 Day 4** Unit 3 Lesson 14.4	**Module 6 Day 5** Unit 3 Lesson 14.5
Module 6 Day 6 Unit 3 Lesson 15.1	**Module 6 Day 7** Unit 3 Lesson 15.2	**Module 6 Day 8** Unit 3 Lesson 15.3	**Module 6 Day 9** Unit 3 Lesson 15.4	**Module 6 Day 10** Unit 3 Lesson 15.5
Module 6 Day 11 Unit 3 Lesson 16.1	**Module 6 Day 12** Unit 3 Lesson 16.2	**Module 6 Day 13** Unit 3 Lesson 16.3	**Module 6 Day 14** Unit 3 Lesson 16.4	**Module 6 Day 15** Unit 3 Practice
Module 6 Day 16 Unit 3 Practice	**Module 6 Day 17** Unit 3 Practice	**Module 6 Day 18** Unit 3 Practice	**Module 6 Day 19** Unit 3 Practice	**Module 6 Day 20** Unit 3 Assessment

DAY 1
2-Digit Addition and Subtraction
Chapter 14: Explore Two-Digit Subtraction
LESSON 14.1
TE, Pg. 195A

<table>
<tr><td>LESSON FOCUS:</td><td>Tens</td></tr>
<tr><td>CALIFORNIA STANDARD:</td><td>Number Sense 2.0
Student estimate, calculate and solve problems involving addition and subtraction of two- and three- digit-numbers.</td></tr>
<tr><td>Purpose of Lesson:</td><td>Understand the relationship between addition and subtraction of single digits to addition and subtraction of tens.</td></tr>
<tr><td>Routine

Materials:
• Transparency of TR 32</td><td>Suggestion: Number of the Day
• Have students brainstorm equations that equal the number of days they have been in school.
• Emphasize using tens.
• On the class number line and 10x18 square chart, fill in the numbers since the last time Number of the Day routine.
Counting Rows of Ten
• Put Pg. TR 32 on the overhead projector.
• Cover all but two rows. Ask, "What do you notice? How many tens? How do you know?"
• Slide the cover up and down, asking, "How many tens?" and "How do you know?"</td></tr>
<tr><td>LAUNCH

• Base ten materials (a variety, including commercially available materials, bundles of sticks, beans and cups, and snap cubes)
• Ones/Tens Relationships overhead</td><td>Ones/Tens Relationships
• Discuss the relationship between the following pairs of equations.
• Let students use models/manipulatives (ten frames, base ten materials, connecting cube trains of tens, etc.) to confirm.
• Students contribute their own ideas to the class chart.

<table>
<tr><td>How does knowing...</td><td>Help you to know...</td></tr>
<tr><td>4 + 3</td><td>4 tens + 3 tens
40 + 30</td></tr>
<tr><td>6 – 2</td><td>6 tens - 2 tens
60 – 20</td></tr>
<tr><td>4 + 5</td><td>4 tens + 5 tens
40 + 50</td></tr>
<tr><td>4 - 1</td><td>4 tens – 1 ten
40 - 10</td></tr>
</table>
</td></tr>
</table>

EXPLORE **Materials:** • One/Tens Relationships worksheet	• Have students build their own table, inserting their own numbers and addition and subtraction equations. • Have them choose one or more equation pairs about which to write a convincing argument.
PRACTICE	**As time allows:** Pgs. 195 and/or 196.
SUMMARIZE	**See Assess TE Pg. 196:** *How can knowing that 9 – 3 = 6 help you know that 90 – 30 = 60?* **Closure:** Revisit purpose of the lesson with students.
HOMEWORK	**Suggestion:** See Advanced Learners, TE Pg. 196A. Students write story problems involving subtraction of tens (e.g., *Marie had 40 stickers. She gave Alfie 30 stickers. How many stickers does Marie have now?)*

Ones/Tens Relationships

Knowing…	Helps me to know…

DAY 2
2-Digit Addition and Subtraction
Chapter 14: Explore Two-Digit Subtraction
LESSON 14.2
TE, Pg. 197A

LESSON FOCUS:	**Mental Math: Tens and Ones**
CALIFORNIA STANDARD:	**Number Sense 2.0** Student estimate, calculate and solve problems involving addition and subtraction of two- and three- digit-numbers.
Purpose of Lesson:	**To understand how to use the hundred chart to see relationships when counting on and back by tens and by ones.**
Routine **Materials:** • Transparency of TR 32	**Suggestion: HOMEWORK Sharing** Students share problems written from HOMEWORK, Module 6, Day 1. **Suggestion: Counting Rows of Ten** • Put Pg. TR 32 on the overhead projector. • Cover all but two rows. Ask, *"What do you notice? How many tens? How do you know?"* • Slide the cover up and down, asking, *"How many tens?" and "How do you know?"*
LAUNCH **Materials:** • 100 chart	**Using a Tool** • Have students locate a number on the 100 chart (e.g., 28). • Ask them to count on three by ones and report the ending number (e.g., 31). • Ask to go back to the original number (e.g., 28) and count on ten and report the ending number (e.g., 38). • Repeat this process, counting on by ones, then counting on by ten (or tens) and counting back by ones, then counting back by ten (or tens). • Ask students: *What happens* (in relationship to placement on the 100 chart) *when you count on/count back by ones? What happens when you count on/count back by tens? How will the 100 chart help you to add and subtract ones and tens?*
EXPLORE **Materials:** • 100 chart (P. TR 33)	In pairs, students give each other problems like those above.
PRACTICE	**As time allows:** Pgs. 197 and/or 198.
SUMMARIZE	**Closure:** Revisit purpose of the lesson with students.
HOMEWORK **Materials:** • Classmate's problems from HOMEWORK, Lesson 14.1, Day 1	**Suggestion:** • Students exchange problems from HOMEWORK, Module 6, Day 1. • They solve the problem, recording their method for solving with words, numbers and/or pictures.

DAY 3
2-Digit Addition and Subtraction
Chapter 14: Explore Two-Digit Subtraction
LESSON 14.3
TE, Pg. 199A

LESSON FOCUS:	**Tens and Ones**
CALIFORNIA STANDARD:	**Algebra and Functions 1.0** Students model, represent, and interpret number relationships to create and solve problems involving addition and subtraction.
Purpose of Lesson:	**Use base ten models to represent tens and ones**
Routine **Materials:** • 100 chart • Transparency of TR 32	**Suggestion: HOMEWORK Sharing** Students share problems written from HOMEWORK, Module 6, Day 2. **Suggestion: Practice Using a Tool (see Launch Day 2, Lesson 14.2)** • Have students locate a number on the 100 chart (e.g., 28). Ask them to count on three by ones and report the ending number (e.g., 31). Ask to go back to the original number (e.g., 28) and count on ten and report the ending number (e.g., 38). Repeat this process, counting on by ones, then counting on by ten (or tens) and counting back by ones, then counting back by ten (or tens). • Ask students: *What happens when you count on/count back by ones? What happens when you count on/count back by tens? How will the 100 chart help you to add and subtract ones and tens?* **Counting Rows of Ten** • Put Pg. TR 32 on the overhead projector. Cover all but two rows. Ask, *"What do you notice? How many tens? How do you know?"* • Slide the cover up and down, asking, *"How many tens?" and "How do you know?"*
LAUNCH **Materials:** • Base ten materials (a variety, including commercially available materials, bundles of sticks, beans and cups, and snap cubes) • Building Tens and Ones overhead	**Introduce: Building Tens and Ones** • Pass out base ten materials. Ask students to freely explore them for about ten minutes looking for patterns and observations. • Students discuss their observations (e.g., "There are ten ones/units in a rod/long," "Ten little cubes make one long rod,"). • Give students numbers to build and ask them to represent these numbers in different ways with the materials. For example, given the number "32," students may build the number with three tens and two ones or two tens and twelve ones. Encourage multiple representations.

<table>
<tr>
<td>EXPLORE

Materials:
• Base ten materials (a variety, including commercially available materials, bundles of sticks, beans and cups, and snap cubes)
• Building Tens and Ones worksheet</td>
<td>Building Tens and Ones
• Students make a list of two digit numbers. They record the number and two representations for each, using pictures words and numbers.

<table>
<tr><th>Number</th><th>First Way</th><th>Second Way</th></tr>
<tr><td>32</td><td>||| – –
30 + 2
3 tens and 2 ones</td><td>– –
|| – – – – –
– – – – –
20 + 12
2 tens and 12 ones</td></tr>
</table>
</td>
</tr>
<tr>
<td>PRACTICE

Materials:
• Base ten materials (a variety, including commercially available materials, bundles of sticks, beans and cups, and snap cubes)</td>
<td>As time allows: More Building Tens and Ones
• Students give a partner a two-digit number to build. The partner builds the number in two ways.
• Students build a number using the fewest base ten pieces (i.e., a “first way” method); partners build using more than ten ones (i.e., a “second way” method.</td>
</tr>
<tr>
<td>SUMMARIZE</td>
<td>Closure: Revisit purpose of the lesson with students.</td>
</tr>
<tr>
<td>HOMEWORK

Materials:
• Popsicle sticks
• Glue
• Pinto beans
OR
• Copies of P. TR 18</td>
<td>Suggestion:
• Have students build their own base ten models in school/at home (or give out Teacher’s Resource Book Pg. TR18).
• Have students practice building and recording multiple representations of numbers similar to Explore/Practice.</td>
</tr>
</table>

Building Tens and Ones

DAY 4

Number	First Way	Second Way

2-Digit Addition and Subtraction
Chapter 14: Explore Two-Digit Subtraction
LESSON 14.4
TE, Pg. 199A (cont.)

LESSON FOCUS:	**Two-Digit Subtraction**
CALIFORNIA STANDARD:	**Algebra and Functions 1.0** Students model, represent, and interpret number relationships to create and solve problems involving addition and subtraction.
Purpose of Lesson:	**To understand at a concrete level how to regroup in subtraction.**
Routine **Materials:** • Base ten materials (a variety, including commercially available materials, bundles of sticks, beans and cups, and snap cubes) • 100 chart	**Suggestion: HOMEWORK Sharing** Students continue share problems written from HOMEWORK, Lesson 14.2, Day 2. **Practice Using a Tool (see Launch, Module 6, Day 2.** Have students locate a number on the 100 chart (e.g., 28). Ask them to count on three by ones and report the ending number (e.g., 31). Ask to go back to the original number (e.g., 28) and count on ten and report the ending number (e.g., 38). Repeat this process, counting on by ones, then counting on by ten (or tens) and counting back by ones, then counting back by ten (or tens). Ask students: What happens when you count on/count back by ones? What happens when you count on/count back by tens? How will the 100 chart help you to add and subtract ones and tens? **Base-Ten Riddles** Present riddles orally or in written form. Students use materials to solve. *I have 22 ones and 3 tens. What number am I?* *I am 37. I have 17 ones. How many tens do I have?* *If you put 2 more tens with me, I will be 46.* *What number am I?* *I have 14 ones. I am between 20 and 30.* *How many tens do I have?*
LAUNCH **Materials:** • Base ten materials (a variety, including commercially available materials, bundles of sticks, beans and cups, and snap cubes) • Two dice per pair of students	**Introducing: Race to Zero** • Demonstrate how to play the game. Students play in pairs to check understanding of rules and concepts. Each team begins with five tens and zero ones and take turns. On a turn, a team rolls the dice and finds the sum. The sum is the amount that needs to be taken away from the current amount (e.g., 50). If there are no ones to remove, ask students what to do in order to be able to remove the amount rolled. • Encourage explanations. Introduce "regrouping" and "renaming". • Discuss the variety of ways in which to represent the same number (e.g., five tens and four tens and ten ones are different ways to represent the same quantity). Teams take turns rolling the dice/number cubes, removing the quantity rolled each time. The team that is first to remove all materials is the winner of the game.
EXPLORE **Materials:**	**Race to Zero** Teams of students (four students total) practice playing Race to Zero.

• Base ten materials (a variety, including commercially available materials, bundles of sticks, beans and cups, and snap cubes) • Two dice per pair of students	
PRACTICE	**As time allows:** Pgs. 199 and/or 200.
SUMMARIZE	**Discuss playing Race to Zero.** Ask students if they had to "regroup"/"rename"/"exchange"/"trade" for each roll. **Closure:** Revisit purpose of the lesson with students. *What is the relationship between 3 tens and 2 ones and 2 tens and 12 ones? How are they alike and how are they different?*
HOMEWORK **Materials:** • Ten sticks and loose beans from HOMEWORK, Day 3, Lesson 14.3 • Two dice	**Suggestion:** Have students play Race to Zero with a family member, using materials from HOMEWORK, Module 6, Day 3 (ten sticks or copies of P. TR 18).

DAY 5
2-Digit Addition and Subtraction
Chapter 14: Explore Two-Digit Subtraction
LESSON 14.5
TE, Pg. 201A

LESSON FOCUS:	Two-Digit Subtraction
CALIFORNIA STANDARD:	**Algebra and Functions 1.0** Students model, represent, and interpret number relationships to create and solve problems involving addition and subtraction.
Purpose of Lesson:	**To find solutions to subtraction problems using meaningful strategies.**
Routine **Materials:** • Base ten materials (a variety, including commercially available materials, bundles of sticks, beans and cups, and snap cubes) • 100 chart	**Suggestion: HOMEWORK Sharing** Students continue share problems written from HOMEWORK, Module 6, Day 2. **Practice Using a Tool (see Launch, Day 2, Lesson 14.2)** • Have students locate a number on the 100 chart (e.g., 28). Ask them to count on three by ones and report the ending number (e.g., 31). Ask to go back to the original number (e.g., 28) and count on ten and report the ending number (e.g., 38). • Repeat this process, counting on by ones, then counting on by ten (or tens) and counting back by ones, then counting back by ten (or tens). • Ask students: *What happens when you count on/count back by ones? What happens when you count on/count back by tens? How will the 100 chart help you to add and subtract ones and tens?* **Base-Ten Riddles** Present riddles orally or in written form. Students use materials to solve. *I have 19 ones and 3 tens. What number am I?* *I am 42. I have 22 ones. How many tens do I have?* *If you put 3 more tens with me, I will be 51. What number am I?* *I have 12 ones. I am between 40 and 50. How many tens do I have?*
LAUNCH **Materials:** • 100 chart • Base ten materials (a variety, including commercially available materials, bundles of sticks, beans and cups, and snap cubes)	**Using Tools to Subtract** • Post a problem from pages 201 or 202. Ask students to think of contexts and tell stories that could be represented by this problem. • Ask several students to share their stories. Ask students: *"Will the answer be less than or greater than the starting number? Why do you think so?"* • Ask students to consider tools that could be used to support them in solving these problems. Some students might be able to solve them mentally and this is acceptable. Some students might resort to use of the tools that have already been used: the 100 chart and base ten materials. Still other students might use alternative ways to solve these problems. • Ask three or four students to demonstrate how they might get

	started solving/solve the posted problem. • Model possible ways of recording a method shared, using words, numbers, and/or pictures.
EXPLORE **Materials:** • 100 charts (P. TR 33) • Base ten materials (a variety, including commercially available materials, bundles of sticks, beans and cups, and snap cubes)	**Post other problems from pages 201 or 202.** Ask students to: • Write a story to match the problem • Solve the problem • Explain how it was solved, using words, numbers, and/or pictures
PRACTICE	**As time allows:** • Students practice other problems from pgs. 201 and 202. It is suggested that students follow the guidelines listed in Explore, above. • If students are working on the actual workbook pages, they need not address the *"Do you need to regroup?"* column on these pages. This will depend on the strategy chosen to solve the problem.
SUMMARIZE	• Teacher selects students to share their meaningful strategy from Explore and Practice, leading a class discussion of what is efficient for one student may not be efficient for another student. **Closure**: Revisit purpose of the lesson with students.
HOMEWORK **Materials:** • Ten sticks and loose beans from HOMEWORK, Day 3, Lesson 14.3 • Two dice	**Suggestion:** Students continue to play Race to Zero at home. Students write about their mathematical experiences while playing the game.