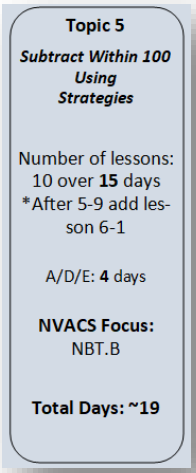
# Grade 2 Topic 5: Subtract Within 100 Using Strategies




Big Conceptual Idea: K-5 Progression on Number and Operations in Base Ten (pp. 8-11)

*Prior to instruction, view the Topic 5 Professional Development Video located in Pearson Realize online. Read the Teacher's Edition (TE): Cluster Overview/Math Background (pp. 119A-119E), the Topic Planner (pp.253A-253C), all 8 lessons, and the Topic Performance Assessments (pp. 319-320A).*

| Mathematical Background: Read Cluster Overview (TE, pp. 119A-119E) | Topic Essential Question: What are strategies for subtracting numbers to 100?<br><br>*Reference Answering the Topic Essential Questions (TE, pp. 315-316) for key elements of answers to the Essential Questions.* |
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***The lesson map for this topic is as follows:***

| 5-1 | 5-2 | 5-3 | 5-4 | 5-5 | 5-6 | 5-7 | 5-8 | 5-9 | 6-1 | Assessment |
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*4 A/D/E days used strategically throughout the topic.*

2nd Grade Pacing Curriculum Framework: Balanced Calendar

*Instructional note:*

The big idea of Topic 4 is to subtract using different strategies.

> *…there is no need to separate place-value instruction from computation instruction. Children's efforts with the invention of their own computation strategies will both enhance their understanding of place value and provide a firm foundation for flexible methods of computation (Van de Walle, Karp, Lovin, & Bay Williams, 2014, p. 176).*
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> *It is not necessary to wait for students to fully develop place-value understandings before giving them opportunities to solve problems with two- and three-digit numbers. When such problems arise in interesting contexts, students can often invent ways to solve them that incorporate and deepen their understanding of place value, especially when students have the opportunities to discuss and explain their invented strategies and approaches (National Council of Teachers of Mathematics, 2000, p. 83).*

Topics 3-6 compose a major cluster focused on the big idea of the base-10 numeration system. Focus instruction on Nevada Academic Content Standards (NVACS) cluster 2.NBT.B. The structure of the base-10 numeration system uses digits 0-9, groups of 10, and place value- the value of a digit is determined by its place. As noted in the quote above, place-value instruction does not need to occur in isolation (Van de Walle, et al., 2014, p. 176). In fact, when students invent addition and subtraction strategies that require the composition (put together) and decomposition (take apart) of numbers, they are developing place-value understanding while simultaneously developing computational understanding.

In kindergarten and first grade, students work with patterns in numbers to 100, and begin to understand a group of ten objects as a unit. That is, they understand ten as both ten ones and one ten. In second grade, students extend these place value understandings to three-digit numbers, understanding one hundred as a bundle of ten tens and as a "hundred". To foster this development, the use of groupable models, models that children can group into tens (connecting cubes, beans in cups, bundles of straws, etc.) are essential. Groupable models allow children to move from operating with ones only, to constructing groups/units, thereby imposing their mathematical understandings onto the model. Students' own construction of this knowledge is important and effective. On the contrary, telling students that a pre-grouped model, such as a tens rod, is worth ten is ineffective. When considering language, help students connect standard language, "thirty-five", to base-ten language, "3 tens and 5 ones; 3 groups of ten and 5 ones, etc". It is also recommended that for EL learners, you choose a single variation of base-ten language to use consistently. This will aid students in connecting the base-ten language to standard language (Van de Walle, et al., 2014, p. 178).

*2.NBT.B Use place value understanding and properties of operations to add and subtract.*

*5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.*

*9. Explain why addition and subtraction strategies work, using place value and the properties of operations.*

The Properties of Operations: Addition and Subtraction

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| Associative property of addition | (a +b) + c = a + (b+c) |
| Commutative property of addition | a + b = b + a |
| Additive identity property of 0 | a + 0 = 0 + a = a |

*Council of Chief State School Officers. (2010). The Nevada Academic Content Standards. Retrieved from http://www.doe.nv.gov/uploadedFiles/nde.doe.nv.gov/content/Standards_Instructional_Support/Nevada_Academic_Standards/Math_Documents/mathstandards.pdf.*

Topic 5 focuses on strategies for subtraction within 100. The strategies in this topic parallel those presented in Topic 3 for addition. They include the hundred chart, count back to subtract and add up to subtract on an open number line, break apart numbers, and compensation (reference lesson-level instructional notes below for content related to each strategy). These reflect the three common types of invented strategy models: 1) split strategies, which involve decomposition such as break apart, 2) jump strategies similar to counting back and add up to subtract, and 3) shortcut strategies such as compensation which involve adjustment of numbers (Van de Walle, et al., 2014, p. 210). In order for students to develop computational fluency, it is important that they be able to use a variety of strategies with understanding and flexibility, adapting to the numbers and context. Van de Walle, et al. stated, "…the issue is no longer a matter of 'knows how to subtract three-digit numbers'; rather it is the development over time of an assortment of flexible skills that will best serve children in the real world" (2014, p. 204).

Although the lessons focus on a particular strategy, encourage students to use the strategy but do not require them to do so. A requirement such as this removes the reasoning from strategy development. Instead, honor student strategies by emphasizing their ability to determine the appropriateness of a strategy and justify its use. As identified in 2.NBT.B.9, second grade students are expected to, "Explain why addition and subtraction strategies work, using place value and the properties of operations." The flexible application of strategies using decomposing and composing numbers also builds students' number sense. It remains important to ensure that all students engage in the *doing* of mathematics through the eight mathematical practices. In particular, all students should engage in MP.5 Use Appropriate Tools Strategically on a daily basis. Students should be encouraged to select and use tools throughout math instruction, with teachers being cognizant of the effect their actions and tool storage systems have on these developing habits of mind.

Math Practice 3: Construct Viable Arguments and Critique the Reasoning of Others
Focus opportunities for students to develop MP.3 behaviors. This is the focus of the Math Practices and Problem Solving lesson 5-9. Reference the Teacher's Edition (pp.F25-F25A) and the *Nevada Academic Content Standards for Mathematical Practice*.

Note: The purpose of the curriculum guides is for additional considerations. Therefore, not all components may have additional notes included in this guide.

| Topic 5 and 6 Essential Academic Vocabulary<br>Use these words consistently during instruction. | |
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| New Academic Vocabulary:<br>(First time explicitly taught) | Review Academic Vocabulary:<br>(Vocabulary explicitly taught in prior grades or topics) |
| | *equation*<br>*difference*<br>*bar diagram*<br>*tens*<br>*ones*<br>*open number line*<br>*break apart*<br>*mental math*<br>*compensation*<br>*subtract* |

***Additional terminology that students may need support with:*** *algorithm, backward, column, forward, minuend (whole), model, row, separate, subtrahend (part subtracting)*

*Collaborative Team Conversations (CTC)

Consider using *one* of the following as part of the formative assessment process at the lesson level to **collect student work** to analyze for evidence of mathematical understanding:

Guiding question: "Are students able to employ strategies such as break-apart/compensation to mentally solve the Number String?"

| Lesson | Evidence | Look for |
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| 5-7 | *Number String* (audio/video recording) | Focus CTC around the big idea:<br>• student strategies and models<br>• communicate thinking orally<br>• use previous expression to solve future expressions |
| 5-8 | *Quick Check* (digital platform) | Focus CTC around data analysis and collection of student workspace (scratch paper). Printable version available under "Teacher Resources". |

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| Learning Cycle Assessments (summative) | *Topic Assessments* SE pp. 315-320 | Use *Scoring Guide* TE pp. 315-320 |

Standards listed in **bold** indicate a focus of the lesson.

| NVACS (Content and Practices) | Mathematical Development of the Big Idea | Instructional Clarifications & Considerations |
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| **Lesson 5-1: Subtract Tens And Ones On A Hundred Chart** | | |
| 2.NBT.B.5<br>2.NBT.B.9<br><br>MP.1<br>MP.3<br>MP.5<br>MP.6<br>MP.7 | Access Prior Learning:<br>In first grade, (1.NBT.C.6) students subtracted multiples of 10 in the range of 10-90 from multiples of 10 in the range of 10-90 using concrete models or drawings and strategies based on place value, properties of operations and/or the relationship between addition and subtraction. They related the strategy to a written method to explain their reasoning.<br><br>In lesson 3-1, second grade students used place value and a hundred chart to add 2-digit numbers within 100.<br><br>Developing the Big Idea:<br>In this lesson, students are *developing* understanding that patterns on a hundred chart can be used to subtract 2-digit numbers. | As indicated in the instructional note at the beginning of this document, encourage students to try the strategy indicated in the instructional materials, but do not require them to use it. Look for evidence of place value understanding and flexible use of strategies.<br><br>The use of a hundred chart reinforces students' understanding of the sequence of numbers to 100. It is also a helpful tool for analyzing the structure of our number system through patterns and can be used to support skip-counting, particularly by 2,s, 5s, and 10s. Consider giving students access to a chart that extends to 200, or even to 1,000 (Van de Walle, et al., 2014, p. 119).<br><br>A note of CAUTION: Watch for students who use the hundred chart rotely, with limited understanding of, or connection to the structure of the number system. When subtracting 34, these students move up 3 boxes because "that's what you do with the first number" and move left 4 boxes because "that's what you do with the second number". By emphasizing opportunities for students to find and explain patterns, we can facilitate conceptual understanding that connects to the procedural use of this tool. The goal being that students understand that jumping down or up represents adding or subtracting by ten, respectively, while right or left movement represents additive or subtractive jumps of one.<br><br>Topic Opener:<br>Consider limiting the *Topic Opener* to discussion of the *Topic Essential Question* (TE, p. 253), *Review What You Know* (TE, p. 254), and *Vocabulary Review Activity* (TE, p. 254) only. Post the essential question and student strategies on your math focus wall.<br><br>Solve & Share:<br>Child-watch for students who use the structure of the hundred chart to count by tens and ones. When students count on from the subtrahend to subtract, help them to understand that they are adding to subtract, and that subtraction is an unknown-addend problem. This will further develop their understanding of the relationship between addition and subtraction.<br><br>If students count by ones only, support place value understanding by asking "How can counting by tens help you solve the problem more efficiently?" Helping students connect the hundred chart to concrete manipulatives will also foster conceptual understanding.<br><br>Visual Learning:<br>Omit the *Visual Learning* Animation. Instead, extend time spent in the *Solve & Share* to focus on patterns on the hundred chart. Have students use a different method to check their work for accuracy. Facilitate a discussion to help students connect these methods to the hundred chart. Also, offer an extension question such as, "What happens if you start at 57 instead of 23?" |

| Lesson 5-2: Count Back To Subtract On An Open Number Line | | |
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| 2.NBT.B.5<br>2.NBT.B.9<br><br>MP.2<br>MP.3<br>MP.5<br>MP.8 | Access Prior Learning:<br>In first grade, (1.NBT.C.6) students subtracted multiples of 10 in the range of 10-90 from multiples of 10 in the range of 10-90 using concrete models or drawings and strategies based on place value, properties of operations and/or the relationship between addition and subtraction. They related the strategy to a written method to explain their reasoning.<br><br>In lesson 3-2 and 3-3, students used an open number line to add tens and ones. In the prior lesson, students subtracted on a hundred chart. The hundred chart can be less efficient, so students will move into the use of an open number line in this lesson.<br><br>Beginning the Big Idea:<br>In this lesson, students are *developing* understanding that the open number line can be used to model subtracting tens from a 2-digit number. | The open number line is an effective tool to support students in explaining their reasoning when using a jump strategy. The open number line offers more flexibility than a regular number line as it allows students to work with any numbers, reduces confusion between hash marks and spaces, and results in fewer computational errors (Van de Walle, et al., 2014, p. 211). In addition, the open number line is a versatile tool that reinforces the inverse relationship between addition and subtraction, supports the development of place value understanding, number sense and computational fluency.<br><br>Solve & Share:<br>Refer to *Analyze Student Work* (TE, p. 261) for examples of possible student solutions. Also child-watch for students who make repeated jumps of 10 and students who make a single jump of 20 or 30. Engage students in a discussion of which jumps are more efficient. We want students to develop the understanding that jumps of multiple groups of ten are more efficient than single jumps of ten (e.g., In solving 50 – 30 = ?, starting at 20, a jump forward of 30 is more efficient than three forward jumps of 10). Students do not need to indicate an operation when labeling jumps on the number line (+10 or -10, instead label with just 10) this helps to reinforce the relationship between addition and subtraction<br><br>Visual Learning:<br>Making jumps of ten in the mid-decades (e.g., 56, 46, 36) may be challenging for some students. Have students use concrete manipulatives such as place value blocks to model the jumps as they are made on the open number line. Also engage students in a discussion of the patterns they notice in the tens digit and ones digit when subtracting tens (e.g., the tens digit decreases by one when subtracting ten; the ones digit remains the same when subtracting ten).<br><br>Assess and Differentiate:<br>In the *Intervention Activity*, "Counting Back Tens" (TE, p. 265A) ask students to look for patterns in the tens digit and ones digit as they count back. |
| **Lesson 5-3: Continue To Count Back To Subtract On An Open Number Line** | | |
| 2.NBT.B.5<br>2.NBT.B.9<br><br>MP.1<br>MP.4<br>MP.5 | Access Prior Learning:<br>In first grade, (1.NBT.C.6) students subtracted multiples of 10 in the range of 10-90 from multiples of 10 in the range of 10-90 using concrete models or drawings and strategies based on place value, properties of operations and/or the relationship between addition and subtraction. They related the strategy to a written method to explain their reasoning.<br><br>In the prior lesson, second grade students used an open number line to subtract tens from a 2-digit number.<br><br>Developing the Big Idea:<br>In this lesson, students are *developing* understanding that numbers can be broken into tens and ones when subtracting on an open number line. This lesson focuses on the count back strategy. | Student reasoning around addition and subtraction is classified into levels of sophistication (Battista, 2012, p. 9-10). Level 1 reasoning describes students who add or subtract numbers as collections of ones (e.g., count all, count on or down by ones, etc). Level 2 reasoning refers to students who use skip-counting by place value parts. Level 3 reasoning includes students who combine or separate place value parts. Therefore, a student at level 2 who makes single jumps of tens and ones (two jumps of 10 and four jumps of 1) is showing less sophisticated reasoning than a student who makes a single jump of a multiple of ten and a group of ones (one jump of 20 and one jump of 4). As you child-watch, look for students' use of these varying levels of sophistication, supporting the development from one level to the next through strategic questioning. For example, "Can you solve the problem in fewer jumps?"<br><br>Solve & Share:<br>Child-watch for students who count back using two jumps of 10 and four jumps of 1 (Level 2). Also, look for students who count back using one jump of 20 and one jump of 4 (Level 3). Highlighting these different strategies, comparing their answers, and considering the efficiency of each will prepare students for the *Visual Learning* while reinforcing place value understanding.<br><br>Visual Learning:<br>During the discussion, connect back to the *Solve & Share*. Ask students to evaluate the efficiency of each example presented in the animation.<br><br>Assess & Differentiate:<br>In the *Intervention Activity*, "Subtraction Drawings and Equations" (TE, p.271A), some students may need additional support through the use of place value blocks (concrete or drawings) connected to the open number line and equation. |

| Lesson 5-4: Add Up To Subtract Using An Open Number Line | | |
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| 2.NBT.B.5<br>2.NBT.B.9<br><br>MP.1<br>MP.2<br>MP.5<br>MP.6 | Access Prior Learning:<br>In first grade, (1.OA.B.4) students understood subtraction as an unknown-addend problem.<br><br>In lessons 3-2 and 3-3, second grade students used an open number line to add tens and ones.<br><br>Developing the Big Idea:<br>In this lesson, students are *developing* understanding that numbers can be broken into tens and ones when subtracting on an open number line. This lesson focuses on the add up to subtract strategy. | Think-addition strategies such as add up to subtract are powerful ways to solve subtraction problems. The add up to subtract strategy lends itself to problems such as 45 - 19, in which students consider how much they need to add to 19 to get 45. For example, 19 + 1 = 20, then 20 + 25 = 45. Therefore, 1 + 25 = 26, so 45 – 19 = 26. This strategy also supports students' use of place value with tens. However, for problems such as 45 - 6 this strategy is not efficient (Van de Walle, et al, 2014, p.215).<br><br>Solve & Share:<br>During problem solving, child-watch for students who use count back and add up strategies to subtract. Sequence the share to finish with student work using the add up strategy, as that is focus of the *Visual Learning* animation. During discussion, ask students why they chose certain jumps, facilitating conversation around the use of landmark or easier numbers.<br><br>Independent Practice/Math Practices and Problem Solving:<br>As previously indicated, students do NOT need to do all of the problems in their student edition. However, ALL students NEED to have opportunities to solve problems at varying DOK levels. The *Independent Practice* page offers problems that support procedural skill and fluency. The *Math Practices and Problem Solving* page offers problems that support application. The quick check items (marked with a pink check) offer both opportunities. Have students complete these items first and continue on to other items as appropriate. |
| **Lesson 5-5: Break Apart Numbers To Subtract** | | |
| 2.NBT.B.5<br>2.NBT.B.9<br><br>MP.3<br>MP.6<br>MP.7 | Access Prior Learning:<br>In lesson 1-7, second grade students made a ten to subtract. In lessons 3-4 and 3-5, students used break-apart strategies to help them add mentally.<br><br>Developing the Big Idea:<br>In this lesson, students are *developing* understanding that when subtracting a 1-digit number from a 2-digit number, 1-digit numbers can be broken apart to make mental subtraction easier. | (Possible 2-day lesson: Choose to extend *either* lesson 5-5 OR 5-6 over two days based upon your students' demonstrated understanding of subtracting using the break apart strategy.)<br>The break-apart strategy extends students' knowledge of the base-ten number system and of basic facts, therefor removing the need for counting. Child-watch for students who count back or add on by ones, paying no attention to the ten. Encourage these children to attend to the ten-structure using ten frames or the hundred chart as a model (Van de Walle, et al., 2014, p.212).<br><br>Solve & Share:<br>Structure the share to highlight students' use of tens to make mental subtraction easier. Similar to Maureen's Work (TE, p.279), watch for students who break apart 7 into 2 and 5, first subtracting 2 to get to 40 (evidence of attending to the ten-structure) before subtracting 5 to get 35. When students break apart 7 in different ways, focus the discussion on evaluating which method is most appropriate to solve the problem, 42 - 7. This will encourage students to think strategically when breaking apart numbers to subtract.<br><br>If students struggle to remove 7 from 42, ask them to show you the value of each digit in the minuend (42). Students who are able to show 4 tens or 40, and 2 ones demonstrate place value understanding. Students who show the tens-digit as 4 ones and the ones-digit as 2 ones, do not show place value understanding of tens. Support these students by asking them to build 42 using groupable models such as counters or connecting cubes. Then, ask these students how many groups of ten they can make. If needed, model how to make a group of ten using ten frames or cube towers. Return to the original prompt, asking the student to show the value of each digit in 42. Help the student connect the visual representation of 40 or 4 tens to the tens-digit in 42. Set a goal with the student, asking them to show the value of each digit in the numbers they work with before subtracting. This support may be needed on an ongoing basis to increase place value understanding. However, it is important that students continue to interact with the grade level content while receiving this support.<br><br>Visual Learning:<br>During the *Guided Practice* section of the lesson, support students who have difficulty breaking apart the subtrahend, by referencing the *Error Intervention* note (TE, p.280). This can be used with a hundred chart or ten frames.<br><br>Independent Practice/Math Practices and Problem Solving:<br>For item 15, have students write an explanation of how the break apart strategy could help them solve the problem. Doing so *before* solving the problem supports MP.1. |

## Lesson 5-6: Continue To Break Apart Numbers To Subtract

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| 2.NBT.B.5<br>2.NBT.9<br><br>MP.1<br>MP.3<br>MP.6<br>MP.7 | Access Prior Learning:<br>In lessons 3-4 and 3-5, second grade students broke apart 2-digit number to add.<br><br>In the prior lesson, students broke apart 1-digit numbers when subtracting from 2-digit numbers.<br><br>Developing the Big Idea:<br>In this lesson, students are *developing* understanding that when subtracting a 2-digit number from a 2-digit number, the numbers can be broken apart to make mental subtraction easier. | Possible 2-day lesson: Choose to extend *either* lesson 5-5 OR 5-6 over two days based upon your students' demonstrated understanding of subtracting using the break apart strategy.<br><br>Solve & Share:<br>Some students may encounter difficulties decomposing a ten when subtracting with place value blocks. Encourage these students to use groupable models, such as connecting cubes, that can be physically broken apart, or ten frames and counters which can be physically removed. In either case, students should construct 53 with tens and ones (e.g., 5 tens and 3 ones, 4 tens and 13 ones) before subtracting to continue to support use of the ten structure. Then have these students return to the place value blocks to see if they can connect their understanding to the pre-grouped models.<br><br>Assessment & Differentiate:<br>For the *Intervention Activity*, "Break Apart Tens and Ones to Subtract" (TE, p.289A), also incorporate the support from the *Solve & Share* note above. |

## Lesson 5-7: Subtract Using Compensation

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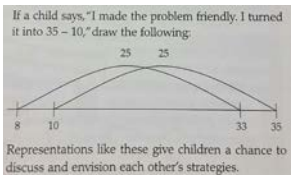
| 2.NBT.B.5<br>2.NBT.9<br><br>MP.1<br>MP.4<br>MP.7<br>MP.8 | Access Prior Learning:<br>In lessons 5-5 and 5-6, second grade students manipulated numbers to solve problems using the break-apart strategy.<br><br>Developing the Big Idea:<br>In this lesson, students are *developing* understanding of the compensation strategy for subtraction. | Possible 3-day lesson<br>A note of CAUTION: Some students may try to apply the compensation strategy for addition to subtraction. However, the compensation strategy for subtraction works differently. When compensating with subtraction, the same amount can be added to each number OR the same amount can be subtracted from each number to result in an easier problem. For example, with 86 - 29, students can add 1 to each number, resulting in 87 - 30. The *Visual Learn*ing presents two ways to compensate. One way adjusts both numbers before the operation. The second way adjusts the subtrahend, conducts the operation, and then adjusts the final answer.<br><br>To support students' conceptual understanding, compensation with subtraction can also be thought of as constant difference. When adjusting the numbers in a subtraction problem, the difference must be kept constant. Representing this idea on an open number line will support students as they construct understanding.<br>  <br><br>Fosnot, C. T. (2007). *Ages and timelines: subtraction on the open number line*. Portsmouth, NH: Firsthand/Heinemann.<br><br>Day 1: Solve & Share, Visual Learning<br>Visual Learning:<br>To support understanding of compensation as creating equivalent expressions, have students use connecting cubes to prove that 43-18 and 45-20 have the same difference of 25. Then, lay the 25 cubes along an open number line and mark the endpoints as 18 and 43. Slide the cubes and mark the new placement of each endpoint at 20 and 45. Continue to explore constant difference, by sliding the cubes to new minuends and subtrahends. Relating constant difference to ages on a timeline is also a helpful real world connection for students.<br><br>Independent Practice/Math Practices and Problem Solving:<br>In the *Intervention Activity*, "Compensate to Subtract!" (TE p.295A), encourage students to use ten frames or the hundred chart to support their work with compensation.<br><br>Day 2: Number String, Independent Practice/Math Practices and Problem Solving<br>Facilitate a lesson using a string of numbers intentionally structured to promote student use of the compensation strategy. These strings are intended to develop students' use of mental math, but do not require students to only solve the problems *in* their heads. Instead, focus on their ability to examine the numbers and select an appropriate and efficient way to solve the problem. As students verbally explain their thinking, make a written record so that students can "see" the strategy using an open number line. This becomes a picture for the class to discuss. Relying only on verbal explanations will limit access for children to understand (Fosnot, 2007, p.7). Although children may begin by using a variety of strategies, through discussion they will notice patterns in the string of problems and in the answers. These patterns will encourage students to examine the numbers *before* selecting a strategy.<br><br>*-continues on next page-* |

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| | | 70 – 35<br>71 – 36<br>72 – 37<br>69 – 34<br>60 – 45<br>61 – 46<br>59 – 44<br>62 – 47<br>Child-watch for students who identify that the first four problems are equivalent expressions. If this is unnoticed, point out that the first four problems have the same answer and ask, "Why is this happening? Which problem is the easiest?" Use of the open number line to model student strategies will support students in their understanding of the compensation strategy, or constant difference. Encourage students to apply this understanding to the last four problems in the string.<br><br>Day 3: Solve & Share, Assess and Differentiate<br>Select a problem from *the Independent Practice* and *Math Practices and Problem Solving* pages (TE, p. 293-294) and use it as a *Solve & Share*. Follow with *Assess and Differentiate*.<br><br>Child-watch for students who have difficulty deciding how to make adjustments. Support these students by encouraging the use of tools, such as open number lines and ten frames, to identify landmarks of ten close to the minuend and subtrahend.<br><br>*CTC: *Number String* (audio/video recording) |
| **Lesson 5-8: Solve One-Step and Two-Step Problems** | | |
| 2.OA.A.1<br><br>MP.1<br>MP.2<br>MP.4<br>MP.5 | Access Prior Learning:<br>In lesson 3-8, second grade students used comparison bar diagrams and equations to solve one- and two-step word problems.<br><br>In lessons 4-7, students continued to solve one- and two-step word problems.<br><br>Developing the Big Idea:<br>In this lesson, students are *developing* understanding that they can use bar diagrams, equations and the relationship between addition and subtraction to solve one- and two-step word problems. | Possible 2-day lesson<br>In general, students find *Add To* and *Take From* problem types easier because they include explicit action. *Put Together* and *Take Apart* problem types are generally more challenging, as they do not include explicit action. Finally, *Compare* problems tend to be the most challenging problem types, as one of the quantities must be conceptualized, as it is not present physically in the problem (CCSWT, 2011). Keep this in mind as you respond to learners. All students need to solve all problem types, but we can use this information to scaffold and extend.<br><br>When working with word problems, avoid key word strategies as they send a message to students that sense-making is not important, they are often misleading, and cannot be used to solve multi-step problems (Van de Walle, et al., 2014, p. 148). Instead, honor sense-making through the use of bar diagrams and the math practices. The *Problem Solving Recording Sheet* (Teaching Tool 1) and *Bar Diagrams* (Teaching Tools 15 and 16) support MP.1 behaviors. Students should also be encouraged to draw their own bar diagrams as a tool that is available to them at all times. These diagrams reinforce understanding of the relationship between addition and subtraction, and help students understand the relationship between the numbers in the problem.<br><br>Day 1: Solve & Share, Visual Learning<br>Solve & Share:<br>The *Solve & Share* is a *Add To Start Unknown* problem type. Although *add to* problems are easier than other problem types, having the unknown in the start position makes this one more difficult. In this case, students know the whole and one part, and must solve for the missing part. Students who attempt to use direct modeling to solve this problem will likely use trial and error. In doing so, watch for students who use trial and error systematically. These students will choose a start number, add 16 more and see if they get a sum of 49. Systematic thinking will be reflected in their ability to reason about the answer to determine if their guess was too low or too high and adjust accordingly. This problem parallels the problem in *Visual Learning*, which is also a *Add To Start Unknown* problem.<br><br>Visual Learning:<br>Consider using the *Problem Solving Record Sheet* (Teaching Tool 1) to engage students in MP.1. Give students time to solve the problem presented in the *Visual Learning* before proceeding with the animation and discussion. This will allow students to connect their learning in the *Solve & Share* and strengthen their entry point into the content.<br><br>*-continues on next page-* |

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| | | Day 2: Independent Practice/Math Practices and Problem Solving, Assess and Differentiate<br>Independent Practice/Math Practices and Problem Solving:<br>If your students demonstrated understanding of the *Add To Start Unknown* problems in the 5-8 *Solve & Share* and *Visual Learning*, strategically select problems from pages 299-300 to foster continued growth with other problem types and two-step word problems (see Suggestion A below). Choose one problem to run as a *Solve & Share* and respond accordingly.<br><br>If your students struggled with the *Add To Start Unknown* problems, strategically select problems from pages 299-300 to facilitate growth towards more challenging problem types (see Suggestion B below). In both cases, support students in their sense making of the numbers and context with manipulatives and bar diagrams. Students will continue to use bar diagrams and solve word problems in enVision, spending a full topic on these problem types in Topic 7.<br><br>Classification of Items (TE, p. 299-300, SE p. 299-300) by Problem Type:<br>*Reference the NVACS, Table 1. Common addition and subtraction situations for examples of these problem types (CCSSO, 2010, p. 88).*<br>• Item 2: *Add To Start Unknown*<br>• Item 3: *Put Together Total Unknown/Take From Result Unknown*<br>• Item 4: *Take From Result Unknown/Add To Result Unknown*<br>• Item 5: *Add To Change Unknown*<br>• Item 6: *Add To Start Unknown*<br>• Item 7: *Compare Bigger Unknown/Add To Result Unknown*<br>• Item 8: *Put Together Total Unknown/Take From Result Unknown*<br><br>Suggestion A:<br>Select and use the following items in a *Solve & Share* format: Item 2, 8, 7. This sequence moves from a one-step *Add To Start Unknown* problem, to a two-step *Put Together Result Unknown/Take From Result Unknown* problem, and finishes with a two-step *Compare Bigger Unknown/Add To Result Unknown* problem.<br><br>Suggestion B:<br>Select and use the following items in a *Solve & Share* format: Item 4, 5, 6. This sequence begins with a two-step *Take From Result Unknown/Add To Result Unknown* problem. This problem was selected because it includes the two easiest problem types for students to direct model due to the explicit action. This problem is followed by a one-step *Add To Change Unknown* problem, and finishes with a one-step *Add To Start Unknown* problem both of which are more challenging problem types due to the placement of the unknown.<br><br>*CTC: *Quick Check* (digital platform) |
| **Lesson 5-9: Math Practices and Problem Solving: Critique Reasoning** | | |
| 2.OA.A.1<br>2.NBT.B.5<br><br>MP.1<br>MP.3<br>MP.4<br>MP.7 | Access Prior Learning:<br>In first grade, students engaged in the Standards for Mathematical Practice including MP. 3 Construct Viable Arguments and Critique the Reasoning of Others.<br><br>In Topic 1, second grade students focused on MP.3 behaviors.<br><br>Developing the Big Idea:<br>In this lesson, students are *developing* understanding that mathematicians construct arguments and critique the reasoning of others. | Students focused on MP3. Behaviors in Topic 1. Consider using the Math Practice 3 Animation on Pearson Realize Online for an example of MP.3 behaviors. Also, consider having students self-reflect on their understanding of this math practice using the Self-Assessment Tool (Teaching Tool 65). Self-reflection engages students in metacognition and encourages a growth mindset in mathematics.<br><br>Include Topic 5 Fluency Practice Activity (TE, p.309).<br><br>Topic 5 Performance Assessment:<br>NOTE: Give Topic 5 Performance Assessment after lesson 6-1. |
| **Lesson 6-1: Regroup 1 Ten For 10 Ones** | | |
| 2.NBT.B.5<br>2.NBT.B.9<br><br>MP.1<br>MP.3<br>MP.5 | Access Prior Learning:<br>In first grade, (1.NBT.B.2a) students understood 10 as a bundle of ten ones. When adding within 100 (1.NBT.C.4), first grade students also understood that it is sometimes necessary to compose a ten. | In this lesson, students will use number sense and concrete place-value blocks to determine if regrouping is needed when subtracting a 1-digit number from a 2-digit number.<br><br>Visual Learning:<br>During the animation, stop after the regrouping of 1 ten as 10 ones. Ask, "*When the ten was regrouped, did the quantity change? Prove it using your place-value blocks.*" Child-watch for<br><br>*-continues on next page-* |

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| MP.8 | Developing the Big Idea:<br>In this lesson, students are *developing* understanding that it is sometimes necessary to regroup 1 ten for 10 ones when subtracting. | students who understand that 3 tens and 4 ones is equivalent to 2 tens and 14 ones. Some students may believe that the quantity has changed. Child-watch for students who regroup the 1 ten, but include the 4 ones already in 34, therefore only trading for 6 more cubes. These students will have changed the quantity from 34 to 30 (2 tens and 10 ones).<br><br>Refer to the *Error Intervention* Note: Item 3 (TE, p.324) for another common misconception and teacher response. |

. CTC: Collaborative Team Conversations evidence collection

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