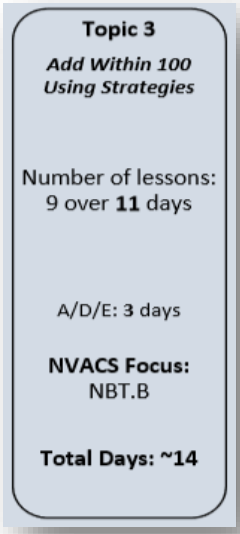
Grade 2 Topic 3: Add Within 100 Using Strategies



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

Prior to instruction, view the Topic 3 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. 119I-119K), the Topic Performance Assessments (pp. 187-188A) and all 9 lessons.

Mathematical Background: Read Cluster Overview (TE, pp. 119A-119E)	Topic Essential Question: What are strategies for adding numbers to 100? *Reference Answering the Topic Essential Questions (TE, pp. 183-184) for key elements of answers to the Essential Questions.*

The lesson map for this topic is as follows:

3-1	3-2	3-3	3-4	3-5	3-6	3-7	3-8	3-9	Assessment

3 A/D/E days used strategically throughout the topic.

2nd Grade Curriculum Pacing Framework: Balanced Calendar

Instructional note:

The big idea of Topic is adding using 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).*
>
> *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 10 as both 10 ones and 1 ten. In second grade, students extend these place value understandings to three-digit numbers, understanding 100 as a bundle of 10 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. 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". To best support EL Learners, it is recommended that 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

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.

Students work on adding within 100 using strategies such as adding tens and ones on a hundred chart and open number line, breaking apart numbers into tens and ones, and using compensation (reference lesson-level instructional notes below for additional content related to each strategy). These models reflect the three common types of invented strategy models (a) split strategies, which involve decomposition, (b) jump strategies similar to counting on and counting back, and (c) shortcut strategies such as compensation, which involve the 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." It also notes that explanations may be supported by drawings or objects. 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 5: Use appropriate tools strategically
Focus on opportunities for students to develop MP.5 behaviors. This is the focus of the Math Practices and Problem Solving lesson 3-9. Reference the Teacher's Edition (pp. F27-F27A) 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.

Essential Academic Vocabulary Use these words consistently during instruction.	
New Academic Vocabulary: (First time explicitly taught)	Review Academic Vocabulary: (Vocabulary explicitly taught in prior grades or topics)
break apart mental math compensation	*tens* *ones* *open number line*

Additional terminology that students may need support with: *landmarks*

*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 developing conceptual understanding and moving their thinking adding on by one's to a deeper understanding of place value?"

Lesson	Evidence	Look for
3-7	*Solve & Share* (student work samples)	Focus CTC around the big idea: • student strategies and models • using different strategies to add two-digit numbers (number lines, hundreds chart, compensation, break apart, etc.)
3-4	*Quick Check* (digital platform)	Focus CTC around data analysis and collection of student workspace (scratch paper). Printable version available under "Teacher Resources".

Learning Cycle Assessments (summative)	*Topic Assessments* SE pp. 183-188	Use *Scoring Guide* TE pp. 183-188

Standards listed in bold indicate a focus of the lesson.

NVACS (Content and Practices)	Big Idea Mathematical Development	Instructional Clarifications & Considerations
Lesson 3-1: Add Tens and Ones on a Hundred Chart		
2.NBT.B.5 2.NBT.B.9 MP.1 MP.2 MP.3 MP.5	Access Prior Learning: In first grade, (1.NBT.C.4) students added within 100, adding a two-digit number and a one-digit number and adding a two-digit number and a multiple of 10 using strategies based on place value. Students understood that sometimes it was necessary to compose a ten when adding tens and tens, and ones and ones. First grade students also had opportunities to work with a hundred chart. Developing the Big Idea: In this lesson, students are *developing* understanding that patterns in the base-10 numeration system can be used to add two 2-digit numbers and to develop mental math strategies and number sense. Students will break apart numbers into tens and ones using the hundred chart as a model.	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). 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 adding 34, these students move down 3 boxes because "that's what you do with the first number" and move right 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 moves down and to the right represent addition; while moves up and to the left represent subtraction. Topic Opener: Consider limiting the *Topic Opener* to discussion of the *Topic Essential Question* (TE, p.119) and *Review What You Know* (TE, pp. 120-122), and the *Topic 3 Vocabulary Words Activity* with the word *tens*. Introduce remaining vocabulary words as they appear in the lessons. Post the question and student strategies on your math focus wall. Consider creating an anchor chart, or adding to the anchor chart started in Topic 1. Visual Learning: Consider omitting the *Visual Learning Animation*. Instead, extend time spent in the *Solve & Share* to focus on patterns on the hundred chart. Also, consider having 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 43 instead of 32?" Assess and Differentiate: For the *On-Level* and *Advanced Activity Center* called "Helping Hands", black out the directions on both versions that say, "Move down to add the tens, and move to the right to add the ones." [See a note of caution above about rote use of the hundred chart.] Instead, add directions for both children to use whiteboards and markers to solve the problem with a second strategy and compare answers with that found on the hundred chart.

Lesson 3-2: Add Tens on an Open Number Line		
2.NBT.B.5 2.NBT.B.9 MP.1 MP.3 MP.4 MP.5 MP.6	Access Prior Learning: In first grade, (1.NBT.C.4) students added within 100, adding a two-digit number and a one-digit number and adding a two-digit number and a multiple of 10 using strategies based on place value. Students used regular number lines and open number lines as models. In the prior lesson, second grade students broke apart 2-digit numbers into tens and ones to add using 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. *-continues on next page-* Developing the Big Idea: In this lesson, students are *developing* understanding that 2-digit numbers can be added by breaking apart the tens and ones. They will represent this thinking with hops or jumps on an open number line.	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. It is unnecessary to label the jumps with the operation (+/-). Labeling the jump with the number only, reinforces the inverse relationship between addition and subtraction. Solve & Share: Child-watch for students who demonstrate varying levels of place value understanding. If a student uses jumps of ones allow them to finish, then ask, "Can you also solve this problem using jumps of ten? Which jumps were more efficient?" For students who make jumps of ten with understanding, ask them, "What patterns do you notice as you count by tens on the number line? OR "Can you think of an even more efficient way to jump?" Finally, if you see students making jumps of multiples of ten, such as 40 either refer to the *Extension for Early Finishers* (TE, p. 129) or ask, "Does it matter which addend you start with? Is one way more efficient than the other?" Students' explanation may also be supported using the suggestions in the English Language Learners example on TE p. 129A. If the opportunity does not arise from your students' work, consider displaying Nico and Sheri's Work (TE p.129) to facilitate a conversation around the Commutative Property. Visual Learning: It is encouraged that teachers stop and discuss at any point in the animation they deem necessary for their students. At the second stopping point in the animation, students are asked "How many tens are in 30?" Use this as an opportunity to formatively assess place value understanding by having students use concrete manipulatives (connecting cubes or place value blocks) to model their answer. If students indicate that 30 is made of 30 tens, they may still be developing understanding of tens as a unit.
Lesson 3-3: Add Tens and Ones on an Open Number Line		
2.NBT.B.5 2.NBT.B.9 MP.2 MP.3 MP.4 MP.5 MP.6	Access Prior Learning: In first grade, (1.NBT.C.4) students added within 100, adding a two-digit number and a one-digit number and adding a two-digit number and a multiple of 10 using strategies based on place value. Students used regular number lines and open number lines as models. In the prior lesson, second grade students added tens to a 2-digit number on the open number line Developing the Big Idea: In this lesson, students are *developing* understanding that open number lines can be used to show how they broke apart a number into tens and ones to add two 2-digit numbers.	See instructional note in lesson 3-2 for information regarding the open number line. In this lesson, students break apart numbers to add two 2-digit numbers, deepening their place value understanding and computational fluency. Encourage discussion that compares students' different ways of jumping on the number line to solve a problem, reinforcing students' understanding of equivalence and their strategic selection of jumps. Visual Learning: The *Error Intervention: Item 2 note* (TE, p. 136) offers a suggestion that supports students' use of compatible numbers. Independent Practice/Math Practices and Problem Solving: Item 10 offers students an opportunity to demonstrate understanding of the Commutative Property of Addition (a + b = b + a). In addition to the three quick check items (marked with pink check marks), ask students to complete item 8 (Part-part-whole problem type) or item 9 (Compare problem type) to offer continued practice with word problems as specified in 2.OA.A.1. Assess and Differentiate: The *Intervention Activity*, "The Numbers Under the Line" (TE, p. 139A) offers students an additional entry point for understanding the open number line as a tool for place value addition strategies through the use of connecting cubes. Use this activity with students who demonstrate inaccuracies with the open number line, or who do not demonstrate understanding of breaking apart numbers into tens and ones with corresponding jumps.
Lesson 3-4: Break Apart Numbers to Add		
2.NBT.B.5 2.NBT.B.9 MP.2 MP.4	Access Prior Learning: In first grade, (1.NBT.C.4) students added within 100, adding a two-digit number and a one-digit number and adding a two-digit number and a multiple of 10 using strategies based on place value.	Mental math strategies refer to strategies used without writing down steps, and often involve the break apart strategy. This promotes flexibility and helps build fluency. Some students may be ready to do computations mentally, others may still be in the direct modeling stage, or need to write down intermediate steps to keep track as they think through the problem. You may be concerned about the time and effort some students use, however, *-continues on next page-*

MP.5 MP.7 MP.8	Students added tens and tens, and ones and ones, and sometimes composed a ten when needed. In the prior lesson, second grade students broke apart 2-digit numbers to add using tens and ones on the open number line. Developing the Big Idea: In this lesson, students are *developing* understanding that 2-digit numbers can be broken apart using tens and ones and added in different ways. They break apart both addends and consider how breaking apart numbers can help them solve problems mentally.	time spent cultivating these early stages in a meaningful way will yield long lasting understanding and ultimately reduce the need for re-teaching. As students become more proficient with flexible methods, encourage them to do appropriate computations mentally (Van de Walle, et al., 2014, p.208). Oftentimes, students will find that using mental strategies based on place value are quicker than using other written strategies, including standard algorithms. An example of such a problem is: 26 + 48. It is quicker to add 50 and 26 to get 76, and then subtract 2 to get 74, than it would be to use the U.S. Traditional Algorithm. Visual Learning: The guided practice items offer students support with breaking apart numbers by including the structure of number frames (boxes for them to write the value of the tens and value of the ones). Students should progress to breaking apart numbers without the frames to support. Alternatively, if students need additional support, encourage them to build addends with connecting cubes, and then physically break the numbers apart into tens and ones. The focus should be helping students construct meaning by connecting the concrete model and breaking action to the abstract numbers (e.g., 17 is composed of 1 ten and 7 ones). Independent Practice/Math Practices and Problem Solving: If time allows, consider using item 13 as an extension in guided practice using the *Problem Solving Recording Sheet* (Teaching Tool 1). This word problem is a Compare Bigger Unknown problem and one of the more challenging problem types. *CTC: *Quick Check* (digital platform)
Lesson 3-5: Continue to Break Apart Numbers to Add		
2.NBT.B.5 2.NBT.B.9 MP.1 MP.4 MP.7	Access Prior Learning: In first grade, (1.NBT.C.4) students added within 100, adding a two-digit number and a one-digit number and adding a two-digit number and a multiple of 10 using strategies based on place value. Students added tens and tens, and ones and ones, and sometimes composed a ten when needed. In the prior lesson, second grade students broke apart both addends into tens and ones when adding two 2-digit numbers. Developing the Big Idea: In this lesson, students are *developing* understanding that 2-digit numbers can be broken apart using tens and ones and added in different ways. They break apart just the second addend and continue to consider how breaking apart numbers can help them solve problems mentally.	See the instructional note in Lesson 3-4 regarding the break apart strategy. Solve & Share: Encourage students to solve the problem using two different strategies to promote flexibility with addition strategies. Strategically select students to share based upon their method. First, select a student whose work reflects the understanding of the majority of students. This allows most students an entry point into the discussion through a strategy they understand. Then, have a child who is using a more sophisticated strategy such as break apart or mental math share. Focus the conversation so students can connect the strategies and make meaning of the more sophisticated method. Visual Learning: When using the *Error Intervention*: Item 2 note in the guided practice, have students use connecting cubes and/or drawings to build the second addend, and then "break" the number apart into tens and ones.
Lesson 3-6: Add Using Compensation		
2.NBT.B.5 MP.2 MP.3 MP.8	Access Prior Learning: In first grade, students broke apart numbers using the 5 and 10 structure. In Topic 1, second grade students used the making ten strategy. Earlier in this topic, students worked with a variety of addition strategies for adding two 2-digit numbers. Developing the Big Idea:	Possible 2-day lesson Compensation for addition makes the problem easier to solve mentally. The same amount is added to one addend, and subtracted from the other addend. For example, students solving 38 + 23 may add 2 to 38, and subtract 2 from 23, resulting in the problem 40 + 21. This strategy shows students' flexibility with numbers, increases their understanding of the inverse relationship between addition and subtraction, and builds fluency. Day 1: Solve & Share: During the discussion around student strategies, encourage students to extend their thinking beyond *what* steps they did to compensate to *why* compensation works for addition. Ask them questions about equivalence, such as "Are 35 + 8 and 40 + 3 equivalent? How do you know?" *-continues on next page-*

	In this lesson, students are *developing* understanding of adding 2-digit numbers using the compensation strategy.	Visual Learning: During the guided practice, watch for a misconception that the sum changes when the addends change. Have students use concrete manipulatives to justify their thinking by building both addends for each equation. Assess and Differentiate: The *Intervention Activity* "Using Compensation to Make a 10" (TE, p. 157A) offers another entry point for students, while supporting the Make a 10 strategy. Day 2: Consider selecting a problem from the *Independent Practice* and *Problem-Solving* pages (TE, pp. 155-156) and making it a *Solve & Share* OR facilitate a mini-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 a clever 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. 58 + 22 60 + 20 30 + 50 28 + 52 32 + 48 33 + 47 98 + 42 97 + 34 Child-watch for students who identify that the first six problems are equivalent expressions. If this is unnoticed, point out that the first six problems have the same answer and ask, "Why is this happening? Which problem is the easiest?" As students demonstrate understanding of the compensation strategy, encourage them to use it to make the last two problems into equivalent but easier expressions. For example, change 98 + 42 to 100 + 40. Child-watch for students who have difficulty deciding how to adjust the addends. Support these students by encouraging the use of tools, such as number lines and ten frames, to identify landmarks of ten close to the addends.
Lesson 3-7: Practice Adding Using Strategies		
2.NBT.B.5 2.NBT.B.6 2.NBT.B.9 MP.2 MP.4 MP.5	Access Prior Learning: Earlier in this topic, second grade students developed strategies for adding 2-digit numbers. Developing the Big Idea: In this lesson, students are *developing* understanding that there are different ways to add 2-digit numbers and that a strategy may be better for one problem than others.	As part of their habits of mind, strategic thinkers look at the context and numbers in a problem to determine the best strategy for solving it. Posting students' strategies on a math focus wall throughout the year can help students select appropriate strategies. Solve & Share: During problem solving, child-watch for students who select a strategy based upon the numbers. Some students may break apart, and others may use compensation For example, in 39 + 43, students may reason that 39 is close to 40. Watch for students who use this landmark of ten to adjust and compensate, resulting in a new equation of 40 + 42 or 40 + 43 – 1. Also, watch for students who use their knowledge of doubles to solve the problem by adding 40 + 40 + 2. Use questioning to guide the class discussion to focus on strategy selection and evaluating the "better" strategy for the given problem. Visual Learning: Consider omitting the *Visual Learning Animation*. Instead, extend time spent in the *Solve & Share*, focusing on a variety of student selected strategies (look for and strategically select students who use the open number line, break apart, and compensation to facilitate discussion around the appropriateness of each strategy for the given problem.) *CTC: *Solve & Share* (student work samples)

Lesson 3-8: Solve One-Step and Two-Step Problems

2.OA.A.1 MP.1 MP.2 MP.4 MP.6	Access Prior Learning: In first grade, (1.OA.A.1) students used addition and subtraction within 20 to solve word problems of varying types, with unknowns in all positions. In lesson 1-9, second grade students solved word problems of varying types, with unknowns in all positions, involving addition and subtraction within 20. Developing the Big Idea: In this lesson, students are *developing* understanding that some word problems can be solved in one-step. Beginning the Big Idea: In this lesson, students are *beginning* understanding that some word problems can be solved in two-steps, requiring a sub-problem or hidden question to be answered first in order to solve original question.	Possible 2-day lesson The NVACS (2.OA.A.1), indicate that second grade students will solve one-step and two-step word problems involving addition and subtraction within 100. These word problems include add to, take from, put together, take apart and compare problem types with unknowns in all positions. Reference the NVACS, Table 1. Common addition and subtraction situations included on the last page of this document, for examples of these problem types (CCSSO, 2010, p. 88). Also reference page 6-7, and 18-21, of the K-5 Progression on Counting and Cardinality and Operations and Algebraic Thinking . Students used bar diagrams and equations to solve word problems in lesson 1-9, and will continue to do so in this lesson. The use of bar diagrams reinforces understanding of the relationship between addition and subtraction, and helps students understand the relationship between the numbers in the problem. Day 1: Solve & Share: A note of CAUTION: Compare Bigger Unknown problems are a more challenging problem type, as they do not include a specific action that students can more easily model, such as "she found __ more" or "he lost ___". For this reason, anticipate that students may need additional time to problem-solve. If students are having trouble understanding the context of the problem, encourage reasoning with concrete manipulatives and bar diagrams to make sense of the problem. Avoid "helping" students by modeling the problem for them and removing the "problem" from problem solving. Visual Learning: Consider asking students to connect the use of comparison bar diagrams in the animation to MP.1 Make Sense of Problems and Persevere in Solving Them by asking questions such as, "How can we use bar diagrams to help us make sense of the problem?" Listen for students who identify the changing placement of the unknown based on the context. Independent Practice/Math Practices and Problem Solving: Consider using some of the items from these pages (TE, pp. 167-168; SE, pp. 167-168) for a *Solve & Share* format in the WCSD Lesson 2 to follow. Day 2: 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. The *Independent Practice* and *Math Practices and Problem Solving* pages from lesson 3-8 (TE, pp. 167-168; SE, pp. 167-168) contain word problems of varying types. If your students struggled with the *Compare Bigger Unknown* problem from the 3-8 Solve & Share, consider strategically selecting problems from pages 167-168 to facilitate growth towards a *compare* problem type (see Suggestion A below). If your students demonstrated understanding of the *Compare Bigger Unknown* problem in the 3-8 *Solve & Share*, strategically select problems from pages 167-168 to foster continued growth with *compare* problems and two-step word problems (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. Classification of items (TE, pp. 167-168; SE pp. 167-168) by Problem Type: *Reference the NVACS, Table 1. Common addition and subtraction situations for examples of these problem types (CCSSO, 2010, p. 88). A copy can be found on the last page of this Topic 3 document.* • Item 2: Compare Bigger Unknown • Item 3: Separate Result Unknown/Join Result Unknown • Item 4: Join Result Unknown • Item 5: Put Together Total Unknown • Item 6: Join Result Unknown/Separate Change Unknown • Item 7: Compare Bigger Unknown • Item 8: Put Together Total Unknown • Item 9: Compare Smaller Unknown/Compare Bigger Unknown • Item 10: Join Result Unknown/Put Together Total Unknown *-continues on next page-*

		Suggestions below are highly recommended to promote understanding: Suggestion A: Select and use the following items in a *Solve & Share* format: Item 4, 10, 7. This sequence moves from a one-step *join* problem, to a two-step *join/put together* problem, and finishes with a one-step *compare* problem. Suggestion B: Select and use the following items in a *Solve & Share* format: Item 2, 6, 9. This sequence moves from a one-step *compare* problem, to a two-step *join/take apart* problem, and finishes with a two-step *compare* problem.
Lesson 3-9: Math Practices and Problem Solving: Use Appropriate Tools		
2.OA.A.1 2.NBT.B.5 MP.1 MP.2 MP.3 MP.5	Access Prior Learning: In first grade, students engaged in the Standards for Mathematical Practice including using appropriate tools strategically. Developing the Big Idea: In this lesson, students are *developing* understanding that mathematicians choose tools that are appropriate for the problem, then use them accurately.	This lesson provides an opportunity to focus on the Thinking Habits associated with Math Practice 5. Refer to the *Math Practices and Problem Solving Handbook* (TE, pp. F27-F27A) for suggestions on how to develop, connect and assess this Math Practice. Also, reference the handbook in the student edition (SE, p. F27). If you have not done so already, add a "Tools" section to your math focus wall for student reference throughout the year. Solve & Share: During problem solving, child-watch for students who select appropriate tools and use them correctly. If you see students solve the problem using a count by 1s approach ask, "Is there a more efficient way to use the tool you chose, or is there a more efficient tool that can help you solve this problem?" These prompts aim to get students to make use of place value using the structure of tens and ones.

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TABLE 1. Common addition and subtraction situations.[6]

	Result Unknown	Change Unknown	Start Unknown
Add to	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
Take from	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[1]
Put Together/ Take Apart[2]	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
Compare[3]	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy?	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have?	(Version with "more"): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have?
	("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? 2 + ? = 5, 5 – 2 = ?	(Version with "fewer"): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? 2 + 3 = ?, 3 + 2 = ?	(Version with "fewer"): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? 5 – 3 = ?, ? + 3 = 5

[1]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.
[2]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.
[3]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.

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.

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