TN Department of Education

Second Grade Mathematics

Instructional Focus Documents

Introduction:

The purpose of this document is to provide teachers a resource which contains:

- The Tennessee grade level mathematics standards
- Evidence of Learning Statements for each standard
- Instructional Focus Statements for each standard

Evidence of Learning Statements:

The evidence of learning statements are guidance to help teachers connect the Tennessee mathematics standards with evidence of learning that can be collected through classroom assessments to provide an indication of how students are tracking towards grade-level conceptual understanding of the Tennessee mathematics standards. These statements are divided into four levels. These four levels are designed to help connect classroom assessments with the performance levels of our state assessment. The four levels of the state assessment are as follows:

- Level 1: Performance at this level demonstrates that the student has a minimal understanding and has a nominal ability to apply the grade/course level knowledge and skills defined by the Tennessee academic standards.
- Level 2: Performance at this level demonstrates that the student is approaching understanding and has a partial ability to apply the grade/course level knowledge and skills defined by the Tennessee academic standards.
- Level 3: Performance at this level demonstrates that the student has a comprehensive understanding and thorough ability to apply the grade/course level knowledge and skills defined by the Tennessee academic standards.
- Levels 4-7: Performance at these levels demonstrates that the student has an extensive understanding and expert ability to apply the grade/course level knowledge and skills defined by the Tennessee academic standards.

The evidence of learning statements are categorized in this same way to provide examples of what a student who has a particular level of conceptual understanding of the Tennessee mathematics standards will most likely be able to do in a classroom setting. The provided evidence of learning statements are examples of what students will most likely be able to do and do not represent an exhaustive list. Additionally for Kindergarten, the standards that provide levels 4-7 are congruent with the scoring rubrics for the kindergarten portfolio. Standards that only provide 4 levels are not included in the portfolio scoring rubric.

Instructional Focus Statements:

Instructional focus statements provide guidance to clarify the types of instruction that will help a student progress along a continuum of learning. These statements are written to provide strong guidance around Tier I, on-grade level instruction. Thus, the instructional focus statements are written for level 3 and 4.

TN Department of Education

Operations and Algebraic Thinking (OA)

Standard 2.OA.A.1

Major Work of the Grade

Add and subtract within 100 to solve one- and two-step contextual problems, with unknowns in all positions, involving situations of add to, take from, put together/take apart, and compare. Use objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Evidence of Learning Statements

Students with a level 1 understanding of this standard will most likely be able to:	**Students with a level 2 understanding of this standard will most likely be able to:**	**Students with a level 3 understanding of this standard will most likely be able to:**	**Students with a level 4 understanding of this standard will most likely be able to:**	**Students with a level 5 understanding of this standard will most likely be able to:**	**Students with a level 6 understanding of this standard will most likely be able to:**	**Students with a level 7 understanding of this standard will most likely be able to:**
Adds and subtracts within 20 to solve contextual problems, involving any of the problem types.	Adds and subtracts **within 100** to solve one-step contextual problems which do not require composing or decomposing tens, using <u>two</u> different situations of add to-start unknown, take-from-start unknown, compare-smaller unknown (version with more), compare-bigger unknown (version with fewer). Represent these problems with a mathematical drawing or concrete models. Students choose a representation in order to explain their thinking to both themselves and others.	Adds and subtracts **within 100** to solve one-step contextual problems which do not require composing or decomposing tens, using <u>two</u> different situations of add to-start unknown, take-from-start unknown, compare-smaller unknown (version with more), compare-bigger unknown (version with fewer). Represent these problems with a mathematical drawing, diagram, or equation with a symbol for the unknown number. Adds and subtracts **within 100** to solve two-step contextual problems. Represent these problems with a mathematical drawing, diagram, or equation(s) Students choose a representation in order to explain their thinking	Adds and subtracts **within 100** to solve one-step contextual problems which require composing or decomposing tens, using <u>three different</u> situations of add to-start unknown, take-from-start unknown, compare-smaller unknown (version with more), compare-bigger unknown (version with fewer). Represent these problems with a mathematical drawing, diagram, or equation with a symbol for the unknown number. Adds and subtracts within 100 to solve two-step contextual problems. Represent these problems with a number line model or equation(s) with a symbol for the unknown number(s).	Adds and subtracts **within 100** to solve one-step contextual problems which do not require composing or decomposing tens, using <u>all</u> of the different situations of add to-start unknown, take-from-start unknown, compare-smaller unknown (version with more), compare-bigger unknown (version with fewer). Represent these problems with a number line model or equation with a symbol for the unknown number. Adds and subtracts within 100 to solve two-step contextual problems. Represent these problems with a number line model and equation(s) with a symbol for the unknown number(s).	Adds and subtracts within 100 to solve a wide variety of two-step contextual problems. Represent these problems with a single equation that encompasses both steps needed to solve the problem. Given two one-step equations arising from the different situations of add to-start unknown, take-from-start unknown, compare-smaller unknown (version with more), compare-bigger unknown (version with fewer), create two unique contextual problems that could be solved using the provided equations.	Given two, two-step equations (one of which incorporates both addition and subtraction) arising from the different situations of add to-start unknown, take-from-start unknown, compare-smaller unknown (version with more), compare-bigger unknown (version with fewer), create two unique contextual problems that could be solved using the provided equations.

		to both themselves and others.				

Instructional Focus Statements

Level 3:

In grade 1, students developed an understanding of adding and subtracting within 20 through interacting with a wide variety of problem-solving situations. Students also began adding a two-digit number to a one-digit number and a two-digit number to a multiple of ten (within 100) in 1.NBT.A.1. In grade 2, there are three significant differences in how students interact with contextual problems. The first is extending the range of numbers students' use for addition and subtraction from within 20 to within 100 encompassing a much larger range of sums and differences. The second is that students are expected to be exposed to all types of common addition and subtraction situations. The table for common addition and subtraction situations is located on page 20 in the TN mathematics standards located here. Finally, is the standard explicitly calls out two-step problems for the first time. In previous grades, no distinction is made as to one-step versus two-step contextual problem solving situations. That said, in previous grades teachers are encouraged to push students to work with two-step contextual situations as determined by student readiness.

As students begin to work with a larger range of numbers and more complex problem solving situations, they should continue to make use of models, drawings, and multiple representations in order to demonstrate their understanding. They may employ strategies that involve counters, linking cubes, ten frames, base ten blocks, part-part-whole models, number lines, bar models, etc. In working with larger numbers, students should begin to transition to more efficient representations of problem situations, looking for and realizing that some representations are easier to use with larger numbers. For example, students should understand that using a bar model, number line, or the numeral itself may be more efficient when working with larger numbers rather than drawing out the number of objects.

In transitioning all students to working with two-step contextual problems, instruction should initially focus on problems involving smaller, familiar numbers and operations allowing students to focus on the conceptual understanding of multiple operations within the problem as opposed to focusing on computation with less familiar numbers. Additionally, it is easier for students to begin with problems that call for the same operation within the problem and then move on to working with two-step problems that involve using both addition and subtraction. It is important to call out that students should continue to use manipulatives, multiple strategies, and written equations when solving two-step contextual problems. To demonstrate their understanding, they should be able to explain the connections between the visual representation and the equation(s) that represents the problem. Additionally, students should be encouraged to use multiple strategies and make connections between each strategy. For example, students may write individual equations for each step in a two-step problem or write both steps in one equation. This is a good opportunity for students to compare their work to others and explain why both are correct or in some cases incorrect and explain the connection between the two strategies.

Teaching key words to associate with addition and subtraction should not be an instructional focus. Instruction should focus on developing an understanding of what operation is needed to solve the problem rather than focusing on key words that sometimes, but not always, associate with the operation.

Level 4-7:

As students deepen their understanding of operations with addition and subtraction with a larger range of numbers and two-step problems, they should be able to represent these problems with a mathematical drawing, diagram, and equation with a symbol for the unknown number. They should

be able to explain their thinking of multiple representations and make connections between the visual representations as well as the problem represented as an equation. As an extension, students should be able to create their own two-step contextual problem and explain the solution. When doing so, students should use visual presentations, equations, and precise mathematical vocabulary.

TN Department of Education

Standard 2.OA.B.2
Major Work of the Grade

Fluently add and subtract within 30 using mental strategies. By the end of 2nd grade, know from memory all sums of two one-digit numbers and related subtraction facts.

Evidence of Learning Statements

Students with a level 1 understanding of this standard will most likely be able to:	Students with a level 2 understanding of this standard will most likely be able to:	Students with a level 3 understanding of this standard will most likely be able to:	Students with a level 4 understanding of this standard will most likely be able to:	Students with a level 5 understanding of this standard will most likely be able to:	Students with a level 6 understanding of this standard will most likely be able to:	Students with a level 7 understanding of this standard will most likely be able to:
Add and subtract within 10 using concrete objects. A context is not provided.	Fluently add and subtract within 10 using mental strategies. A context is not provided. Students should quickly, efficiently, and accurately produce answers without recording their thinking on paper. Add and subtract within 30 using concrete objects. A context is not provided.	Fluently add and subtract within 30 using mental strategies. A context is not provided. Students should quickly, efficiently, and accurately produce answers without recording their thinking on paper.	Fluently add and subtract within 30 using mental strategies. A context is not provided. Students should quickly, efficiently, and accurately produce answers without recording their thinking on paper. Students should explain or defend their answer, such as, decomposing and recomposing the numbers, properties of operations, place value, or describing mental images used to obtain the answer.	Fluently add and subtract within 30 using mental strategies. A context is not provided. Students should quickly, efficiently accurately produce answers without recording their thinking on paper. Students should explain or defend their answer in at least <u>two</u> different ways, such as, decomposing and recomposing the numbers, properties of operations, place value, or describing mental images used to obtain the answer.	Given a correct work sample of adding two numbers within 30, identify that the computation is correct, identify the strategy used, and explain why the strategy works. Given a correct work sample of subtracting two numbers within 30, identify that the computation is correct, identify the strategy used, and explain why the strategy works.	Given an incorrect work sample of adding two numbers within 30, correct the mistake and explain the mathematical misunderstanding that would cause the mistake to happen. Given an incorrect work sample of subtracting two numbers within 30, correct the mistake and explain the mathematical misunderstanding that would cause the mistake to happen.

Instructional Focus Statements

Level 3:

As stated in the introduction of the Tennessee Mathematics Standards, fluency is the ability to apply procedures accurately, efficiently, and flexibly. By the end of grade 1, students fluently added and subtracted within 20 using mental strategies and knew from memory all sums up to 10. By the end of grade 2, students should extend this understanding to fluently add and subtract within 30 using mental strategies.

Building fluency that is based on mental strategies is a process. Students begin by developing a conceptual understanding of the operations of addition and subtraction through direct modeling. The next natural progression is for students to work with student-driven, invented strategies that are deeply rooted in place value and number sense. Students began working with invented strategies with adding and subtracting within 20 in standard 1.OA.C.5. Before they reach fluency with mental strategies, students must be given the opportunity to interact with direct modeling and/or student-invented

strategies in order to have the mathematical foundation needed to move along the continuum towards reaching fluency with mental strategies. This process takes time. Students should be exposed to various strategies and choose the one that is most efficient and makes the most sense to them, ultimately utilizing their strategies for mental computation as they progress in their learning. It is important to note that timed tests do not build fluency in students. Exposure to flexible thinking, explaining their thoughts, and appropriate scaffolding over time do.

As students become more fluent with adding and subtracting numbers within 30, they should start to produce answers without recording their thinking and explaining their mental thought process. Students should explain or defend their answer, such as, decomposing and composing the numbers, properties of operations, place value, or describing mental images used to obtain the answer. Additionally, students should have many opportunities to practice, explain their thinking, and compare and make connections with multiple strategies. Number Talks, written explanations, and selecting the strategy that makes the most sense to them will allow students to develop a conceptual understanding to become fluent with adding and subtracting within 30 and know from memory all sums of two one-digit numbers and related subtraction facts.

One final note, algorithms for addition and subtraction are not introduced within the standards until grade 3.

Level 4-7:
As students develop a wider range of mental strategies that they are comfortable with and can explain, they should be able to explain the connections that exist between multiple strategies. They should also be able to, given a work sample of adding or subtracting two numbers within 30, identify if the computation is correct or incorrect, identify the strategy used, and explain why the strategy works or does not work. Students should also be able to explain what misconception took place to produce an incorrect answer. It is imperative that as students transition to using mental strategies that they are asked questions that press for the underlying mathematics and that students provide an explanation of their thinking using precise mathematical vocabulary.

TN Department of Education

Number and Operations in Base Ten (NBT)

Standard 2.NBT.B.5

Major Work of the Grade

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

Evidence of Learning Statements

Students with a level 1 understanding of this standard will most likely be able to:	**Students with a level 2 understanding of this standard will most likely be able to:**	**Students with a level 3 understanding of this standard will most likely be able to:**	**Students with a level 4 understanding of this standard will most likely be able to:**	**Students with a level 5 understanding of this standard will most likely be able to:**	**Students with a level 6 understanding of this standard will most likely be able to:**	**Students with a level 7 understanding of this standard will most likely be able to:**
Accurately add or subtract two numbers within 10. No context is provided.	Accurately add or subtract two numbers within 20. No context is provided.	Fluently and accurately add and subtract within 100 using properties of operations, strategies based on place value, and/or the relationship between addition and subtraction. No context is provided.	Fluently and accurately add and subtract within 100 using properties of operations, strategies based on place value, and/or the relationship between addition and subtraction. No context is provided. Students must explain or defend the accuracy of their answer and the strategy used.	Fluently, flexibly and accurately add and subtract within 100 using properties of operations, strategies based on place value, and/or the relationship between addition and subtraction. No context is provided. Students must explain or defend the accuracy of their answer by showing two different strategies.	Fluently, flexibly and accurately add multiple addends within 100 using properties of operations, strategies based on place value, and/or the relationship between addition and subtraction. No context is provided. The multiple addends should naturally illicit the use of different strategies. Students must explain or defend the accuracy of their answer by not only showing multiple strategies, but also by explaining why one strategy is more efficient than another strategy. Fluently, flexibly and accurately subtract multiple numbers within 100 using properties of operations, strategies based on place value, and/or the relationship	Fluently, flexibly and accurately add and subtract multiple numbers within 100 within the same problem using properties of operations, strategies based on place value, and/or the relationship between addition and subtraction. No context is provided. The multiple addends and subtrahends should naturally illicit the use of different strategies. Students must explain or defend the accuracy of their answer by not only showing multiple strategies, but also by explaining the mathematical benefit from using the chosen strategies.

					between addition and subtraction. No context is provided. The multiple subtrahends should naturally illicit the use of different strategies. Students must explain or defend the accuracy of their answer by not only showing multiple strategies, but also by explaining why one strategy is more efficient than another strategy.	

Instructional Focus Statements

Level 3:

As stated in the introduction of the Tennessee Mathematics Standards, fluency is the ability to apply procedures accurately, efficiently, and flexibly. Fluency is about a student being able to flexibly think about the problem posed in order to efficiently answer by employing a strategy from their tool box that makes sense in that particular situation leading to an accurate answer. There is no one strategy that works every time for every student. Each child develops fluency from the strategies that individually work best for them.

In kindergarten and grade 1, students began to develop an understanding of the base-ten number system. In 1.NBT.C.4 students added a two-digit number to a one-digit number and a two-digit number to a multiple of ten (within 100). In grade 2, students continue developing this understanding so that by the end of grade 2 they can fluently add and subtract within 100 using properties of operations, strategies based on place value, and/or the relationship between addition and subtraction. This work will be foundational as students extend their learning to adding and subtracting within 1000 using concrete models in 2.NBT.B.7. The use of place value and physical objects from previous course work should be continued in this standard. The natural progression of learning begins with direct modeling. It is important that students who still need direct modeling in order to grasp the mathematics be allowed to do so. With these students, it will be important over the course of the year to help them move from direct modeling to more strategy based approaches. Ultimately strategy based approaches are what builds fluency for students. The foundation of this standard and ultimately fluency for addition and subtraction relies on the understanding of three major concepts; computation of sums and differences of all one-digit numbers, the ability to flexibly compose and decompose numbers, and combining like units (regrouping).

Initially, students may need to use direct modeling with visual models and diagrams to help them grasp the conceptual understanding of decomposing, composing, and combining like units (regrouping). This may be accomplished with base ten blocks, linking cubes, or other hands on manipulatives. Once a student no longer needs the manipulatives, they move to more strategy based thinking. For example, as students find the sum of 36 + 27, they should understand that the decomposition of each number is 3 tens and 6 ones + 2 tens and 7 ones, respectively. From previous work in grade 1, students should understand that the ones can be combined into a new group of ten. In this example, 7 ones and 6 ones are combined to form a new

group of ten and 3 ones. It is imperative that students develop a deep understanding of combining units by using visual representations such as base ten blocks, ten frames, and bundling manipulatives first before moving to a purely strategy based approach. Students should also understand that the composition, including the newly formed unit, results in 3 tens + 2 tens + 1 ten + 3 ones, resulting in a total of 6 tens and 3 ones, or 63. It is also beneficial to provide experiences using open number lines and the hundreds chart, using benchmarks of tens to help students develop strategies for adding and subtracting. Additionally, written equations should be used in conjunction with visual representations.

As students work with multiple representations and strategies, they should be able to make connections between the representations and strategies, including written equations, and explain which strategy is most efficient for them for a particular problem. It is also important to note that this standard integrates very nicely with 2.MD.B.6 where students work with sums and differences on a number line. Number line strategies are a very visual way to help build operational fluency for students.

Students should encounter equations that are written both vertically and horizontally. Students should also make estimates when adding and subtracting to determine if their solution is reasonable. Using estimation and the understanding of reasonableness will be a foundational skill that students will use throughout future grade levels/courses. As students become fluent with addition and subtraction within 100, they should be able to accurately compute the correct answer, flexibly use multiple representations, and choose the strategy that is most efficient.

Level 4-7:
Students should solidify their understanding by flexibly, accurately, and efficiently adding multiple addends within 100 using properties of operations, strategies based on place value, and/or the relationship between addition and subtraction. The multiple addends or subtrahends should naturally illicit the use of different strategies. Students must explain or defend the accuracy of their answer by not only showing multiple strategies, but also by explaining why one strategy is more efficient than another strategy. As students express their thinking in written and verbal formats, they should use precise mathematical language, diagrams, and written equations.

TN Department of Education

Standard 2.NBT.B.6
Major Work of the Grade

Add up to four two-digit numbers using properties of operations and strategies based on place value.

Evidence of Learning Statements

Students with a level 1 understanding of this standard will most likely be able to:	Students with a level 2 understanding of this standard will most likely be able to:	Students with a level 3 understanding of this standard will most likely be able to:	Students with a level 4 understanding of this standard will most likely be able to:	Students with a level 5 understanding of this standard will most likely be able to:	Students with a level 6 understanding of this standard will most likely be able to:	Students with a level 7 understanding of this standard will most likely be able to:
Accurately add three or four numbers with sums less than 20 using properties of operations and strategies based on place value.	Accurately add three or four numbers with sums within 100 which do not require composing or decomposing tens, using properties of operations and strategies based on place value.	Add three or four two-digit numbers with sums within 100 which require composing or decomposing tens, using properties of operations and strategies based on place value.	Add three two-digit numbers with sums greater than 100 which require composing and decomposing tens, using properties of operations and strategies based on place value.	Add four two-digit numbers with sums greater than 100 which require composing and decomposing tens, using properties of operations and strategies based on place value.	Given a whole number within 100, create three different equations each involving the sum of at least three addends and requires regrouping that add up to the provided whole number. Explain the properties of operations or place-value based strategies that could be used to solve each of the three created expressions.	Given a whole number greater than 100, create three different equations each involving the sum of at least four addends and requires composing tens that add up to the provided whole number. Explain the properties of operations or place-value based strategies that could be used to solve each of the three created expressions.

Instructional Focus Statements

Level 3:

As students continue to expand their toolbox with strategies that can be used to efficiently add two two-digit numbers, they should gradually begin to work with a greater number of addends. In 2.NBT.B.6, students should add up to four two-digit numbers using properties of operations and strategies based on place value. This should be scaffolded by first introducing students to adding three two-digit numbers and encouraging the use of previously learned strategies that include using the commutative, associative, and identity properties. The commutative and associative properties are particularly helpful as they allow students to reorder a string of numbers so that they are presented in a way that makes combining the numbers more efficient for the student. For example, when adding 24 + 18 + 32, one student might add 18 and 32 first to get 50 and then add 24 to get a total of 74. Another student might decompose the 18 to 16 + 2 giving 24 + 16 + 2 + 32 in order to get 40 + 2 + 32 yielding 74. Both are correct and both demonstrate ways in which students can flexibly combine numbers one using a property and one not.

As students use different strategies and properties, they should continue to use visual representations such as a number line as they make sense of which addend order best works for their thinking. As students begin to add with four two-digit numbers, it is easier for them to start with problems with

no regrouping and over time transition to working with cases where regrouping is needed. As in previous work, students may need to use strategies that involve manipulatives and direct modeling to help them understand problems that require regrouping.

Level 4-7:
As students solidify their understanding of adding up to four two-digit numbers, they should be flexible in using multiple strategies and representations, Students should be able to construct a viable argument (MP 3) as to why their way is the most efficient way to add the numbers. Further, they should be able to critique the reasoning of others (MP 3) as their explanations are provided. Additionally, students should be to produce a string of numbers whose sum is a given a whole number greater than 100. In doing so, they should be able to create three different equations each involving the sum of at least four addends and requires composing tens that add up to the provided whole number. They should also be able to explain the properties of operations or place-value based strategies that could be used to solve each of the three created expressions.

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Standard 2.NBT.B.7

Major Work of the Grade

Add and subtract within 1000 using concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction to explain the reasoning used.

Evidence of Learning Statements

Students with a level 1 understanding of this standard will most likely be able to:	Students with a level 2 understanding of this standard will most likely be able to:	Students with a level 3 understanding of this standard will most likely be able to:	Students with a level 4 understanding of this standard will most likely be able to:	Students with a level 5 understanding of this standard will most likely be able to:	Students with a level 6 understanding of this standard will most likely be able to:	Students with a level 7 understanding of this standard will most likely be able to:
Use a concrete model to add or subtract two whole numbers with sums/differences within 100 which do not require composing or decomposing tens.	Add and subtract two whole numbers with sums/differences within 1000 which do not require composing or decomposing tens or hundreds. Students should explain their answer using concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	Add and subtract two whole numbers with sums/differences within 1000 which require composing or decomposing tens or hundreds, but not both. Students should explain their answer using concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	Add and subtract two whole numbers with sums/differences within 1000 which require composing or decomposing both tens and hundreds. Students should explain their answer using concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	Add and subtract three or more whole numbers with sums/differences within 1000 which require composing or decomposing both tens and hundreds. Students should explain their answer using concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Add four two-digit numbers with sums greater than 100 which require composing and decomposing tens, using properties of operations and strategies based on place value.	Add more than three whole numbers with a sum within 1000, where composing both tens and hundreds is required using two different strategies. Students should explain each using concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Additionally, they should be able to describe how their two selected strategies are similar and how they are different.	Subtract more than three whole numbers with a difference within 1000, where decomposing both tens and hundreds is required using two different strategies. Students should explain each using concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Additionally, they should be able to describe how their two selected strategies are similar and how they are different.

Instructional Focus Statements

Level 3:

In previous grades, students began to develop a conceptual understanding of adding and subtracting through a progression of three stages of learning: concrete, representational, and abstract. Instruction within grade 1 exclusively focused on understanding addition and subtraction through concrete and representational learning. Students in 2.NBT.B.5 demonstrate fluency with addition and subtraction within 100 using properties of operations,

strategies based on place value, and/or the relationship between addition and subtraction. As students build on this understanding, they should continue to use concrete and representational learning and transition to adding and subtracting a larger range of numbers within 1000 over time.

In the concrete learning stage, instruction should focus on direct modeling. Students should be physically manipulating objects or creating drawings to solve math problems. The initial focus for this standard should be on having students use direst modeling techniques and strategies to move towards representational strategies to add and subtract within 1000. When thinking about choosing numbers to add and subtract within 1000, consider that direct modeling can become very cumbersome. That said, it is important to select friendly numbers. Students should be encouraged to look for patterns in their process and answers when they are adding and subtracting as this will also cause them to think about more efficient ways of combining the numbers. It is important to note that direct modeling is a necessary developmental phase which allows children who are not ready for more efficient methods a way to explore the same problems as classmates who have progressed beyond this stage.

Base ten blocks are very helpful in helping model hundred's, ten's, and one's for students who have developed the conceptual understanding that the rod representing a ten is comprised of 10 ones and a flat representing a hundred is comprised of 10 tens. As students have developed this understanding in working with addition and subtraction in grade 1 and due to the magnitude of the numbers being added and subtracted, it is appropriate to utilize base 10 blocks with students. As students are working with them, make sure to ask students to explain how they are using the blocks to check their understanding of composing and decomposing hundreds and tens.

As students are solidifying their understanding of adding and subtracting within 1000, they should build upon their own "invented strategies" developed in grade 1. Invented strategies are when students begin eliciting their understanding of composing and decomposing numbers in flexible ways in order to more quickly figure out a computation. Some examples of invented strategies are compensation, counting on, counting back, or making a ten. It is important to note that for many students, these strategies are easier, more intuitive, and quicker than the standard algorithm that is not introduced until grade 3. For example, when finding the sum of 234 and 126, students should make use of previous composing and decomposing strategies to make tens and hundreds. Decomposing the addition problem by place value as (200 + 30 + 4) + (100 + 20 + 6) is one way that students may efficiently find the sum. In doing so, students should use previous understandings of regrouping and making tens and hundreds resulting in 300 + 50 + 10 = 360. This is just one example of a student-invented strategy. Students should be encouraged to compare and contrast to find the strategy that works the best for them. Students should, over time, build on the range of numbers with which they are adding and subtracting.

Students can also subtract within 1000 by viewing a subtraction problem as an unknown addend problem, e.g., 276 + ? = 425. Also, counting-on and adding-on methods for addition can be used for subtraction. Additionally, many students struggle with subtracting numbers that have zero tens and/or zero ones, sometimes referred to as "subtraction across zeros". It is imperative that students conceptually understand how to compose and decompose numbers when regrouping is necessary. For example, when subtracting 400 – 274, students should be able to "break apart" a hundred as ten tens and a ten as ten ones. This should be done with direct modeling with manipulatives and drawings for students to grasp the conceptual understanding that will be needed in future grades.

As students work with concrete and representational strategies, including student-invented strategies, they should be able to explain their reasoning, make connections to different solution paths, and explain the similarities and differences and relationship between the two using precise mathematical vocabulary.

Level 4-7:
As students extend their understanding, they should be able to add and subtract three or more whole numbers with sums and differences within 1000 which require composing or decomposing both tens and hundreds. Students should also be able to explain their answer using concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Additionally, students should be able to explain, using mathematical precise vocabulary, the connections that exists between multiple strategies across both addition and subtraction. Students should be able to construct a viable argument (MP 3) to justify when strategies are more efficient.

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Standard 2.NBT.B.9
Major Work of the Grade

Explain why addition and subtraction strategies work using properties of operations and place value. (Explanations may include words, drawings, or objects.)

Evidence of Learning Statements

Students with a level 1 understanding of this standard will most likely be able to:	Students with a level 2 understanding of this standard will most likely be able to:	Students with a level 3 understanding of this standard will most likely be able to:	Students with a level 4 understanding of this standard will most likely be able to:	Students with a level 5 understanding of this standard will most likely be able to:	Students with a level 6 understanding of this standard will most likely be able to:	Students with a level 7 understanding of this standard will most likely be able to:
Accurately add and subtract two numbers within 10 using one of the following strategies: counting all, counting on or counting back. Defend the solution and explain the strategies with words, drawings, or objects. Students should show one strategy for addition and one strategy for subtraction.	Accurately add and subtract two numbers within 50 using one of the following strategies: counting on, counting back, or counting down to (subtraction only) strategy. Defend the solution and explain the strategies with words, drawings, or objects. Multiple problems may be used to show the strategies listed.	Accurately add and subtract within 100 using properties of operations and/or place value. These strategies must include one of the following: adding/subtracting one number in parts, adding by place, adding up (subtraction only), or changing and adjusting the number(s). Defend the solution and explain the strategies with words, drawings, or objects. Multiple problems may be used to show the strategies listed.	Accurately add and subtract within 100 using properties of operations and/or place value. These strategies must include two of the following: adding/subtracting one number in parts, adding by place, adding up (subtraction only), or changing and adjusting the number(s). Defend the solution and explain the strategies with words and/or drawings. Multiple problems may be used to show the strategies listed.	Accurately add and subtract within 100 using properties of operations and/or place value. These strategies must include adding/subtracting one number in parts, adding by place, and changing and adjusting the number(s). Defend the solution and explain the strategies with words and/or drawings. Multiple problems may be used to show the strategies listed.	Choose 2 different strategies that can be used to accurately add two numbers within 100. Explain how the two strategies are related and explain why one strategy is more efficient than another using appropriate mathematical vocabulary. Choose 2 different strategies that can be used to accurately subtract two numbers within 100. Explain how the two strategies are related and explain the strengths and weaknesses of each strategy using appropriate mathematical vocabulary.	Given 2 different mathematical strategies for addition, generate two expressions that when solved the process would be more efficient using the identified strategy and explain why the given strategy works for each created expression. Given 2 different mathematical strategies for subtraction, generate two expressions that when solved would benefit from using the identified strategy and explain why the given strategy works for each created expression.

Instructional Focus Statements

Level 3:

As students solidify their learning of addition and subtraction, they should be able to explain their strategies based on their understanding of place value and the properties of addition and subtraction. Students should demonstrate this understanding using a variety of concrete methods such as place value manipulatives, hundreds charts, open number lines, and drawings. They should also use representational and student-invented strategies

to demonstrate their understanding. The focus of this standard is explaining what it means to add and subtract numbers. Although this is the focus for this standard, students should also be explaining their thinking throughout all OA and NBT standards.

In contextual problems, student explanations should be focused on why they chose a particular operation to solve a problem. Students may use either addition or subtraction to solve the same problem. They should be able to explain their reasoning to why the operation they chose will solve the problem. Students should be challenged to make connections as to why other methods are also accurate for computation. For example, the addition problem 25 + ? = 34 and the subtraction problem 34 - ? = 25, could both be used to solve the same contextual problem. The underlying importance is for students to explain their reasoning on the method they selected and accurately solve the problem using any method of their choice.

As students use multiple representations of concrete models, representational strategies, equations, and written explanations in solving addition and subtraction, they should be able to make and explain connections between the multiple representations.

Level 4-7:
As students extend their understanding of explaining why addition and subtraction strategies work using properties of operations and place value, they should be able to add and subtract flexibly with a variety of strategies. This includes adding/subtracting one number in parts, adding by place, and changing and adjusting the number(s). Students should also be able to demonstrate more than one strategy for addition and subtraction and explain the connection between the two strategies. Additionally, students should be able to explain why one strategy is more efficient in some cases than other cases and defend their reasoning using precise mathematical vocabulary.

TN Department of Education

Measurement and Data (MD)

Standard 2.MD.B.5

Major Work of the Grade

Add and subtract within 100 to solve contextual problems involving lengths that are given in the same units by using drawings and equations with a symbol for the unknown to represent the problem.

Evidence of Learning Statements

Students with a level 1 understanding of this standard will most likely be able to:	**Students with a level 2 understanding of this standard will most likely be able to:**	**Students with a level 3 understanding of this standard will most likely be able to:**	**Students with a level 4 understanding of this standard will most likely be able to:**	**Students with a level 5 understanding of this standard will most likely be able to:**	**Students with a level 6 understanding of this standard will most likely be able to:**	**Students with a level 7 understanding of this standard will most likely be able to:**
Students should show one strategy for addition and one strategy for subtraction. Adds and subtracts **within 20** to solve contextual problems involving lengths given with the same units. The problems must include both addition and subtraction. Represent these problems with mathematical drawings or concrete models.	Adds and subtracts **within 100** to solve contextual problems involving lengths given with the same units which do not require composing or decomposing tens, using <u>two</u> different situations. These two situations must include both addition and subtraction. Represent these problems with mathematical drawings or concrete models.	Adds and subtracts **within 100** to solve contextual problems involving lengths given with the same units which do not require composing or decomposing tens, using <u>two</u> different situations. These two situations must include both addition and subtraction. Represent these problems with a mathematical drawing and equation with a symbol for the unknown number.	Adds and subtracts **within 100** to solve contextual problems involving lengths given with the same units which require composing or decomposing tens, using <u>two</u> different situations. These two situations must include both addition and subtraction. Represent these problems with a mathematical drawing and equation with a symbol for the unknown number.	Adds and subtracts **within 100** to solve contextual problems involving lengths given with the same units which require composing or decomposing tens, using <u>three</u> different situations. These situations must include both addition and subtraction. Represent these problems with a number line model and equation with a symbol for the unknown number.	Adds **within 100** to solve contextual problems involving 3 or more lengths given with the same units which require composing or decomposing tens. Represent these problems with a number line model and equation with a symbol for the unknown number. Subtracts **within 100** to solve contextual problems involving 3 or more lengths given with the same units which require composing or decomposing tens. Represent these problems with a number line model and equation with a symbol for the unknown number.	Solves contextual problems involving 4 or more lengths in which the situation requires a mix of addition and subtraction in order to solve the problem. Additionally, the problem involves lengths given with the same units and the mathematics requires both composing and decomposing tens. Represent these problems with a number line model and equation with a symbol for the unknown number.

TN Department of Education

Instructional Focus Statements

Level 3:

In standard 2.OA.A.1, students develop an understanding of adding and subtracting within 100. The focus of this standard is to specifically integrate lengths that are given in the same units into contextual situations with the same numeric boundaries. Students should continue to use drawings and equations with a symbol for the unknown to represent the problem. Students should use their understanding of addition and subtraction to combine and compare lengths of objects in both one and two step problems. Students should be able to add two lengths to obtain the length of the whole. Students should also be able to subtract one length from another to find out the difference in lengths. In doing so, students should be provided with a variety of opportunities and multiple representations to apply addition and subtraction to solve problems that involve length. For example in the contextual problem, *"Jill built a toy train that is 25 inches long. Sammy built a toy train that is 16 inches long. How much longer is Jill's train than Sammy's train, in inches?* Students should use concrete models and drawings to represent the length of the trains and determine the difference between the two. As with other grade-level standards, this contextual problem can be solved with either addition or subtraction. Students should write an equation that represents the contextual problem such as "25 – 16 = n or 16 + n = 25." As students use addition and subtraction equations to represent problems, they should be able to explain the relationship between the two representations.

It is also important that students work with the same unit of measurement in contextual problems. As students attend to precision, they should be presented with realistic contextual problems and manipulatives to make a real-world connection. Students may use student-created number lines and drawings that are not true to size. Although this is appropriate, non-precise representations may be confusing to students. That said, this standard is a nice integration of 2.MD.B.6 where students represent whole numbers from 0 on a number line and know that the points corresponding to the numbers on the number line are equally spaced. Using graph paper and folded paper can be useful tools when drawing equally spaced points on a number line.

As students solve contextual problems, they should be able to justify their choice of operation. As mentioned above, both addition and subtraction equations can be used to solve problems and it is imperative that students are able to explain their reasoning. Teaching key words to associate with addition and subtraction should not be an instructional focus. Instruction should focus on developing an understanding of what operation can be used to solve the problem rather than focusing on key words that sometimes, but not always, associate with the operation.

Level 4-7:

As students extend their understanding of adding and subtracting within 100 to solve contextual problems involving lengths, they should be flexible with representing problems using multiple representations such as a number line, equation, and written explanation. Instruction should focus on extending student understanding as they are challenged to work with three and four objects embedded in multi-step problems. These situations should include a mix of addition and subtraction in order to solve the problem. Students should also be able to explain their chosen solution path using precise mathematical vocabulary.

TN Department of Education

Standard 2.MD.B.6

Major Work of the Grade

Represent whole numbers as lengths from 0 on a number line and know that the points corresponding to the numbers on the number line are equally spaced. Use a number line to represent whole number sums and differences of lengths within 100.

Evidence of Learning Statements

Students with a level 1 understanding of this standard will most likely be able to:	Students with a level 2 understanding of this standard will most likely be able to:	Students with a level 3 understanding of this standard will most likely be able to:	Students with a level 4 understanding of this standard will most likely be able to:	Students with a level 5 understanding of this standard will most likely be able to:	Students with a level 6 understanding of this standard will most likely be able to:	Students with a level 7 understanding of this standard will most likely be able to:
Given a number line model marked with whole number increments, students locate a whole number and explain that the number represents the length from zero to that number.	Given a number line model marked with whole number increments, students locate a whole number and explain that the number represents the length from zero to that number.	Students represent addition and subtraction of whole number lengths within 100 by creating a number line model. Students mark and label the number line model they draw with equal spaces and use the number line to model their strategy and solution	Students represent addition and subtraction of whole number lengths within 100 by creating a number line model. Students mark and label the number line model they draw with equal spaces and use the number line to model their strategy and solution	Students solve contextual problems involving addition and subtraction of lengths within 100. Students model the problem with by drawing a number line model and an equation to represent the situation. Students defend their strategies and solutions with a verbal or written explanation.	Given a number line model depicting addition within 100, students write the addition equation modeled and then generate a contextual problem involving lengths that can be solved by the provided model.	Given a number line model depicting subtraction within 100, students write the subtraction equation modeled and then generate a contextual problem involving lengths that can be solved by the provided model.

Instructional Focus Statements

Level 3:

In previous grades, students may have encountered and worked with number lines as a strategy with counting and cardinality, addition, and subtraction. Standard 2.MD.B.6 will be a student's first formal introduction to number lines. The instructional focus for this standard is for students to understand and represent whole numbers as lengths from 0, know that the points corresponding to the numbers on the number line are equally spaced, and use the number line for addition and subtraction.

Students should understand that the points corresponding to the numbers on the number line are equally spaced. That said, it is important for students to be given ample opportunity to work equally with pre-generated and student-generated number lines. Instruction should start with pre-generated number lines. It is important for students to understand that the points on the number line are equally spaced. As students begin to transition to student-generated number lines, they should be given opportunities and methods to create number lines with equally spaced points. Drawing equally spaced points on a number line is difficult for students. Using graph paper and folded paper can be useful tools when attending to precision to create number lines with equally spaced points.

As students use number lines to represent whole number sums and differences, they should model counting on and counting back by drawing "jumps" on the number line to represent the problem. Students should also use previous addition and subtraction strategies of adding to, taking from, putting

together, taking apart, and comparing using illustrated "jumps" on the number line. As students utilize number lines to represent addition and subtraction, it is appropriate to work with a variety of increments, including 1's, 5's, and 10's. It is easier for students to visualize the illustration of addition and subtraction by one-unit "jumps" when using a number line in increments of 1's. However, when working with a larger range of numbers it may be easier for students to work with an open number line. The focus for this part of the standard is on addition and subtraction and it is appropriate to use non-precise, student-generated number lines. For example, when finding the difference of 83 – 29, students may use an open number line and place a point on 83 and "jump" back 4 increments of 10 units and "jump" back 4 increments of 1 resulting in the difference of 54. This may result in the accurate solution without attention to the equally spaced increments of 10's and 1's on the same number line, which could be confusing to students. It is more important that students label their 'jumps" and understand the difference between the two numbers rather than the spacing accuracy on the number line. In this case, an open number line may be more efficient as students are working with increments of 10's and 1's. This is one of many strategies for using a number line for addition and subtraction and students should explore multiple solution paths and be able to explain why they have selected their chosen method. Additionally, students should be able to make connections between solution paths and explain their reasoning using mathematical precise vocabulary.

Level 4-7:
As students extend their understanding, they should solve contextual problems involving addition and subtraction within 100 increasing in rigor over time. Students should be able to model the problem by drawing a number line model and an equation to represent the situation. Students should also be able to defend their strategies and solutions with a verbal or written explanation. Additionally, students should use a given number line model depicting addition or subtraction within 100, write the equation modeled, and then generate a contextual problem that can be solved by the provided model.