NEW MEXICO
Public Education Department

2.OA:OPERATIONS & ALGEBRAIC THINKING

Cluster Statement: A: Represent and solve problems involving addition and subtraction.

Major Cluster (Students should spend the large majority of their time (65-85%) on the major work of the grade/course. Supporting work and, where appropriate, additional work should be connected to and engage students in the major work of the grade.)

Standard Text	**Standard for Mathematical Practices**	**Students who demonstrate understanding can:**
2.OA.A.1 **Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.**	SMP 1: Students can make sense of problems and persevere in solving them by visualizing what is happening in the problem and how the components are related. SMP 2: Students can reason abstractly and quantitatively by using numbers and symbols to represent quantities. SMP 4: Students can model with mathematics by using pictures, number lines and other representations to model and solve problems.	• Identify the unknown in an addition or subtraction word problem. • Determine operation needed to solve addition and subtraction problems in situations including add to, take from, put together, take apart, and compare. • Use drawings or equations to represent one- and two-step word problems. • Add and subtract within 100 to solve one-step word problems with unknowns in all positions. • Write an addition and subtraction equation with a symbol for the unknown. **Depth of Knowledge:** 1-2 **Bloom's Taxonomy:** Understand and Apply

Previous Learning Connections	**Current Learning Connections**	**Future Learning Connections**
• Connect to experiences solving all addition and subtraction problems types. Initially, the meaning of addition is separate from the meaning of subtraction. The problems are limited to numbers within 20 and one-step problems **(1.OA.1)**.	• Connect to relationships between addition and subtraction. Students apply strategies to solve one- and two-step addition/subtraction problems within 100 to length situations **(2.MD.5, 2.MD.6)** and to problems with bar graphs (2.MD.10). • Connect to the developing understanding of the meaning of operations and computational fluency **(2.OA.2).**	• Connect to applying strategies to one and two-step problems involving the four operations (addition, subtraction, multiplication, division). Student will learn to use a letter to represent an unknown **(3.OA.8).**

Clarification Statement:
Second Grade students extend their work with addition and subtraction word problems in two major ways. First, they represent and solve word problems within 100, building upon their previous work to 20. In addition, they represent and solve one and two-step word problems of all three types (Result Unknown, Change Unknown, Start Unknown).
As second grade students solve one-and two-step problems, they use manipulatives such as snap cubes, place value materials (groupable and pre-grouped), ten frames, etc.; create drawings of manipulatives to show their thinking; or use number lines to solve and describe their strategies. They then relate their drawings and materials to equations. By solving a variety of addition and subtraction word problems, second grade students determine the unknown in all positions (Result Unknown, Change Unknown, and Start Unknown). Rather than a letter ("n"), boxes or pictures are used to represent the unknown number.
Second Graders use a range of methods, often mastering more complex strategies such as making tens, doubles, and near-doubles for problems involving addition and subtraction within 20. Moving beyond counting and counting-on, second grade students apply their understanding of place value to solve problems.

Common Misconceptions

- Students might assume all separate problems are subtraction and all join problems are addition and not pay attention the part of the problem that is unknown.
- Students may only solve one part of a two-part problem because they are used to only performing one operation to find the answer to a problem.

Multi-Layered System of Supports (MLSS)/Suggested Instructional Strategies

Pre-Teach

Pre-teach (targeted): *What pre-teaching will prepare students to productively struggle with the mathematics for this cluster within your HQIM?*

- For example, some learners may benefit from targeted pre-teaching that analyzes common misconceptions when studying representing and solving problems involving addition and subtraction because there a common misconception when students begin to bridge their skills to working within word problems. Students can benefit from analyzing common errors and misunderstandings and connecting them to their own. For example, students can perform and error analysis with an anonymous work sample or mock work sample, looking for patterns in misconceptions

Pre-teach (intensive): *What critical understandings will prepare students to access the mathematics for this cluster?*

- 1 NBT.C4: This standard provides a foundation for work with representing and solving problems involving addition and subtraction because adding and subtracting within 100 fluently will help students move to within 1000. If students have unfinished learning within this standard, based on assessment data, consider ways to provide intensive pre-teaching support prior to the start of the unit to ensure students are ready to access grade level instruction and assignments.

Core Instruction

Access

Interest: *How will the learning for students provide multiple options for recruiting student interest?*

- For example, learners engaging with representing and solving problems involving addition and subtraction benefit when learning experiences include ways to recruit interest such as providing contextualized examples to their lives and modeling instruction because students who make relevant connections to their everyday lives may establish appropriate cognitive learning. Proper modeling may assist students in adopting the teacher's thinking process, creating their own reasoning as well as acquiring proper mathematical word problem solving skills.

Build

Effort and Persistence: *How will the learning for students provide options for sustaining effort and persistence?*

- For example, learners engaging with representing and solving problems involving addition and subtraction benefit when learning experiences attend to students attention and affect to support sustained effort and concentration such as using prompts or scaffolds for visualizing desired outcomes because students need to understand the learning goal is not always finding the answer, but sometimes the learning goal is finding the entry point or extracting information.

Language and Symbols: *How will the learning for students provide alternative representations to ensure accessibility, clarity and comprehensibility for all learners? (e.g., a graph illustrating the relationship between two variables may be informative to one learner and inaccessible or puzzling to another; picture or image may carry very different meanings for learners from differing cultural or familial backgrounds)*

- For example, learners engaging with representing and solving problems involving addition and subtraction benefit when learning experiences attend to the linguistic and nonlinguistic representations of mathematics to ensure clarity can comprehensibility for all learners such as pre-teaching vocabulary and symbols, especially in ways that promote connection to the learners' experience and prior knowledge because students will have a better understanding for extracting information from the problem if they understand the language used within addition and subtraction word problems.

Expression and Communication: *How will the learning provide multiple modalities for students to easily express knowledge, ideas, and concepts in the learning environment?*

- For example, learners engaging with representing and solving problems involving addition and subtraction benefit when learning experiences attend to the linguistic and nonlinguistic representations of mathematics to ensure clarity can comprehensibility for all learners such as pre-teaching vocabulary and symbols, especially in ways that promote connection to the learners' experience and prior knowledge because students will have a better understanding for extracting information from the problem if they understand the language used within addition and subtraction word problems.

Internalize

Comprehension: *How will the learning for students support transforming accessible information into usable knowledge, knowledge that is accessible for future learning and decision-making?*

- For example, learners engaging with representing and solving problems involving addition and subtraction benefit when learning experiences attend to students by intentionally building connections to prior understandings and experiences; relating important information to the learning goals; providing a process for meaning making of new learning; and, applying learning to new contexts such as providing templates, graphic organizers, concept maps to support note-taking because organizing the information within a real life context allows students to find an entry point and organizational strategy for sorting through pieces of given information in order to determine whether the problem requires addition or subtraction, or a total verses a missing number.

Re-teach

Re-teach (targeted): *What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisiting during a unit?*

- For example, students may benefit from re-engaging with content during a unit on representing and solving problems involving addition and subtraction by providing specific feedback to students on their work through a short mini-lesson because it is imperative that students' understand their own learning, misconceptions and ideas.

Re-teach (intensive): *What assessment data will help identify content needing to be revisited for intensive interventions?*

- For example, some students may benefit from intensive extra time during and after a representing and solving problems involving addition and subtraction unit by offering opportunities to understand and explore different strategies because one strategy does not fit all learners. For example, some students may benefit from breaking the numbers apart into place value pieces for spatial disconnects.

Extension

What type of extension will offer additional challenges to 'broaden' your student's knowledge of the mathematics developed within your HQIM?

- For example, some learners may benefit from an extension such as the application of and development of abstract thinking skills when studying representing and solving problems involving addition and subtraction because students can benefit from looking at numbers in different ways. For example, if a student is finding the sum of 10 and 9 students can be asked other ways to find that sum other than adding the two numbers.

Culturally and Linguistically Responsive Instruction:

Validate/Affirm: How can you design your mathematics classroom to intentionally and purposefully legitimize the home culture and languages of students and reverse the negative stereotypes regarding the mathematical abilities of students of marginalized cultures and languages?
Build/Bridge: How can you create connections between the cultural and linguistic behaviors of your students' home culture and language the culture and language of school mathematics to support students in creating mathematical identities as capable mathematicians that can use mathematics within school and society?

Building Procedural Fluency from Conceptual Understanding: Instruction should build from conceptual understanding to allow students opportunities to make meaning of mathematics before focusing on procedures. When new learning begins with procedures it privileges those with strong prior familiarity with school mathematics procedures for solving problems and does not allow learning to build for more methods for solving tasks that occur outside of school mathematics. For example, when studying representing and solving problems involving addition and subtraction the types of mathematical tasks are critical because not all students learn procedurally. Some students need to know the why before the how. Some like to know the how before the why All students should be encouraged to explain the relationship between place value and regrouping and how this applies to the procedures for addition and subtraction.

Standards Aligned Instructionally Embedded Formative Assessment Resources:
Source: http://tasks.illustrativemathematics.org/content-standards/2/OA/A/1/tasks/1
This type of assessment question requires students to read word problems, identify unknown numbers in all positions and determine whether to add or subtract to solve. SMP1 is important here as students must make a plan for the solution, and a meaning of their solution**.**
This task allows you to assess solving for unknown in different positions, adding/subtracting 2-digit numbers (place value) and making meaning of problem and solution.

Relevance to families and communities:	**Cross-Curricular Connections:**
During a unit focused on representing and solving problems involving addition and subtraction consider options for learning from your families and communities the cultural and linguistic ways this mathematics exists outside of school to create stronger home to school connections for students, for example, letting students experiment with drawing and solving representations that are	Social Studies: Students can connect the idea of solving multi-step problems to analyzing information from tables and graphs.

familiar to them can benefit their understanding of the concept of addition and subtraction.	