NEW MEXICO
Public Education Department

1.OA: OPERATIONS & ALGEBRAIC THINKING

Cluster Statement: D: Work with addition and subtraction equations.

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:**
1.OA.D.7: Understand the meaning of the equal sign and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 - 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.	SMP 2: Students can reason abstractly and quantitatively by transitioning from using concrete objects that represent equations to using symbols. SMP 6: Students can attend to precision by relating mathematical symbols to their meaning in developmentally appropriate ways (= represents the concept of "same as", + represents addition, — represents subtraction and □ [or a similar symbol] represents finding the unknown in an equation).	• Explain the meaning of equal using models and drawings. • Determine if two quantities are equal. • Represent equal quantities with an equation with operations on either side, neither side, or both sides of the equal sign. • Determine whether an equation is true or false. **Depth of Knowledge:** 2-3 **Bloom's Taxonomy:** Analyze and Evaluate
Standard Text	**Standard for Mathematical Practices**	**Students who demonstrate understanding can:**
1.OA.D.8: Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = _ - 3, 6 + 6 = _.*	SMP 3: Students can construct viable arguments by explaining how they found the unknown value in an equation and critique the reasoning of others comparing how others' solutions are like and different from their own. SMP 7: Students can look for and make use of structure by solving for the unknown in various positions in addition and subtraction equations.	• Determine the unknown in various positions in an addition equation. • Determine the unknown in various positions in a subtraction equation. • Explain how an unknown in an equation was determined. **Depth of Knowledge:** 2 **Bloom's Taxonomy:** Apply and Analyze

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Previous Learning Connections	Current Learning Connections	Future Learning Connections
• Connect to comparing the number of objects in one group to the number of objects in another group to decide if they are equal, as well as comparing two written numbers between 1 and 10 and discussing if they are equal. **(K.CC.6-7)**	• Connect to changing the structure of problems (e.g., changing a subtraction problem to an addition problem) and being flexible with the position of unknowns and the location of the equal sign in equations (e.g., 5 + 4 = 9 or 9 = 5 + 4) **(1.OA.3-4)**	• Connect writing equations to express equivalent groups and the ideas of even numbers, equal parts, skip counting, etc. **(2.OA.3-4)** • Connect to writing equations to solve word problems. **(2.OA.1)** • Connect to thinking about inequalities and students continuing to use their understanding of the equal sign. **(1.NBT.4)**

Clarification Statement:

- In this standard, students develop an understanding of the meaning of the **equal sign** and apply their understanding in order to determine whether an equation is true. Students learn that the equal sign does not mean "the answer comes next", but that the symbol signifies an equivalent relationship. Students need to understand that an **equation** needs to "**balance**", with **equal quantities** on both sides of the equal sign. Once students understand the meaning of the equal sign, they can determine if an equation is true (9 = 9) or not true (9 = 8).

Common Misconceptions

● Students thinking that the equals sign means that an operation must be performed on the numbers on the left and the result of this operation is written on the right.

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 introduces new representations (e.g., number lines) when studying work with addition and subtraction equations because OA.D is a new concept for first graders there are no kindergarten standards that link to it, therefore going into detail about what an equal sign is and the importance of it, is very important for a deep understanding.

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

- 1.OA.D.7: This standard provides a foundation for work with addition and subtraction equations because first graders are introduced to this standard for the first time in first grade and in order to be successful in the rest of their computing careers in school they need to master this first skill of understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. 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

Perception: *How will the learning for students provide multiple formats to reduce barriers to learning, such as providing the same information through different modalities (e.g., through*

vision, hearing, or touch) and providing information in a format that will allow for adjustability by the user?

- For example, learners engaging with work with addition and subtraction equations benefit when learning experiences ensure information is accessible to learners with sensory and perceptual disabilities, but also easier to access and comprehend for many others such as offering alternatives for visual information such as descriptions (text or spoken) for all images, graphics, video, or animations; touch equivalents (tactile graphics or objects of reference) for key visuals that represent concepts; objects and spatial models to convey perspective or interaction; auditory cues for key concepts and transitions in visual information because Students must use mathematical symbols correctly and describe the meaning of the symbols they use. In this case, they understand that the equal sign denotes that the quantities on either side have the same value and use this understanding flexibly to identify and express equivalences. When crafting their explanations, they learn to communicate their reasoning by using precise mathematical vocabulary describing each quantity accurately.

Build

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

- For example, learners engaging with work with addition and subtraction equations benefit when learning experiences attend to students attention and affect to support sustained effort and concentration such as providing feedback that models how to incorporate evaluation, including identifying patterns of errors and wrong answers, into positive strategies for future success because OA.D is a major cluster therefore students need to meet mastery in order be proficient in the grade level. Providing feedback that allows for identifying mistakes and turning them into positive strategies makes them goal driven learners.

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 work with addition and subtraction equations 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 in order for students to really understand the equal sign they must know what it means. Therefore, connecting it to prior learning allows for deeper understanding.

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 work with addition and subtraction equations benefit when learning experiences attend to the multiple ways students can express knowledge, ideas, and concepts such as using physical manipulatives (e.g. blocks, 3D models, base-ten blocks) because first graders are still at conceptual understanding and need to move to a more application level using manipulatives to help them achieve this.

Internalize:

Executive Functions: *How will the learning for students support the development of executive functions to allow them to take advantage of their environment?*

- For example, learners engaging with work with addition and subtraction equations benefit when learning experiences provide opportunities for students to set goals; formulate plans; use tool and processes to support organization and memory; and analyze their growth in learning and how to build from it such as embedding prompts to "show and explain your work" (e.g., portfolio review, art critiques) because it is important for students to see their work and others work.

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 work with addition and subtraction equations by critiquing student approaches/solutions to make connections through a short mini-lesson because in order for students to truly be successful in addition or subtraction fluidly they need to be proficient in understanding what the equal sign means and be able to solve.

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 unit work with addition and subtraction equations by helping students move from specific answers to generalizations for certain types of problems because students should solve addition and subtraction equations with different structures so that they are able to see the connections between addition and subtraction more easily. Examples should be presented with the sum or difference on either side of the equal sign in order to dispel the notion that it means "compute."

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 work with addition and subtraction equations because as student become more fluent with adding and subtracting they need to be able to solve no matter where the equal sign is to have them build their fluency skills.

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?

Supporting Productive Struggle in Learning Mathematics: The standard for mathematical practice, makes sense of mathematics and persevere in solving them is the foundation for supporting productive struggle in the mathematics classroom. "Too frequently, historically marginalized students are overrepresented in classes that focus on memorizing and practicing procedures and rarely provide opportunities for students to think and figure things out for themselves. When students in these classes struggle, the teacher often tells them what to do without building their capacity for persistence." Teachers need to provide tasks that challenge students and

maintain that challenge while encouraging them to persist. This encouragement or "warm-demander" requires a strong relationship with students and an understanding of the culture of the students. For example, when studying work with addition and subtraction equations. Supporting productive struggle is critical because when solving addition and subtraction students need consistent fluency practice without a lot of guidance from teachers. Allowing them to productively struggle with these equations will encourage perseverance no matter the culture of the child.

Standards Aligned Instructionally Embedded Formative Assessment Resources:

Find the Missing Number

Find the missing number in each of the following equations:

9-3=_ 8+_=15 16-_=5 _=7-2 13=_+7 6=14-_

This type of assessment question requires students to solve addition and subtraction equations with different structures so that they can see the connections between addition and subtraction more easily. Examples should be presented with the sum or difference on either side of the equal sign in order to dispel the notion that means "compute."

Source: https://achievethecore.org/coherence-map/1/5/45/45

Relevance to families and communities:

During a unit focused on work with addition and subtraction equations, 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, Continue to practice adding and subtracting within 20 or Practice "counting on" as a strategy for addition, e.g. if you have 7 LEGO pieces, and then you get 3 more, encourage your student to start with the number 7 and count "8...9...10" to find the total. Discuss various ways to take apart a given number, e.g. 6 is made of 1 and 5, 2 and 4, 3 and 3, etc.

Cross-Curricular Connections:

Language Arts: Literature can offer connections to help students find the unknown in various positions in addition and subtraction equations such as: *Safari Park* by Stuart J. Murphy.

Physical Education: Keeping score during a team game can offer connections to help students understand that equal means the "same as" or "tied". Basketball, football or another game where the number of total number of points could be scored in a variety of different ways (e.g. 2 touchdowns + 1 safety = 2 touchdowns + 2 conversions) is especially helpful in developing this idea.