NEW MEXICO
Public Education Department

1.OA: OPERATIONS & ALGEBRAIC THINKING

Cluster Statement: C: Add and subtract within 20.

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.C.5: Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).	SMP 5: Students can use tools by using a variety of materials as they continue to work on counting strategies to find sums and differences. SMP 7: Students can look for and make use of structure by looking for patterns as they use counting strategies, including for which facts counting is an efficient strategy.	• Represent addition and subtraction with base ten blocks, counters, ten frames, number lines, and drawings. • Add by counting all and counting on. • Explain that one can count on from either addend in an addition equation. • Recognize that +1 means the next number and that +2 means the next-next number in the counting sequence. • Subtract by counting back or counting on. • Explain that one can count back the total amount being subtracted (i.e. in 9-7, one can count back 7) or that one can count back to the number being subtracted (i.e. in 9-7, one can count back to 7). • Recognize that -1 means the number before and that -2 means the number that is two numbers before in the counting sequence.
		Depth of Knowledge: 1-2
		Bloom's Taxonomy: Remember, Understand and Analyze

NEW MEXICO
Public Education Department

<table>
<tr>
<td>Standard Text

1.OA.C.6: Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 - 4 = 13 - 3 - 1 = 10 - 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 - 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).</td>
<td>Standard for Mathematical Practices
SMP 6: Students can attend to precision by accurately, automatically and flexibly knowing their addition and subtraction facts within 10.

SMP 7: Students can look for and make use of structure by extending their use of addition and subtraction strategies to sums within 20.</td>
<td>Students who demonstrate understanding can:
• Consistently add within 10 with accurate and efficient results
• Consistently subtract within 10 with accurate and efficient results
• Use strategies to find sums and differences when they can't be recalled quickly, including counting on, make a ten and doubles
• Show or explain their thinking

Depth of Knowledge: 1-2

Bloom's Taxonomy:
Remember, Understand and Apply</td>
</tr>
<tr>
<td><u>Previous Learning Connections</u>
• Connect to counting to 100 and count on from any given number within 100. (K.CC.1)
• Connect to reading and writing to 20 and demonstrating one-to-one correspondence when counting objects. (K.CC.3, K.CC.4a)</td>
<td><u>Current Learning Connections</u>
• Connect to developing fluency (working flexibly, accurately, efficiently and appropriately) when adding and subtracting within 10 but continuing to use strategies to solve within 100 and explaining their reasoning. (1.NBT.4)</td>
<td><u>Future Learning Connections</u>
• Connect to fluently adding and subtracting within 20 using mental strategies and mentally adding two 1-digit numbers. (2.OA.2)</td>
</tr>
<tr>
<td colspan="3">Clarification Statement:
• 1.OA.C.5: Unlike counting down, counting on reinforces that subtraction is an unknown-addend problem. Learning to think of and solve subtractions as unknown addend problems makes subtraction as easy as addition (or even easier), and it emphasizes the relationship between addition and subtraction.

• 1.OA.C.6: Students might use the commutative property of addition to change ? + 6 = 15 to 6 +? = 15, then count on or use methods to compose 4 (to make ten) plus 5 (ones in the 15) to find 9. Students might reverse the action in the situation represented by ? - 6 = 9 so that is becomes 9 + 6 = ?. Or they might use their knowledge that the total is the first number in a subtraction equation and the last number in an addition equation to rewrite the situation equation as a solution equation: ? - 6 = 9 becomes 9 + 6 = ? or 6 + 9 = ?. Appendix from K, Counting and Cardinality; K–5, Operations and Algebraic Thinking: Methods used for solving single-digit addition and subtraction problems</td>
</tr>
</table>

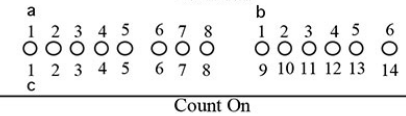
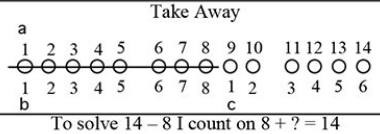
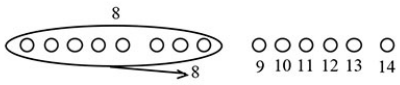
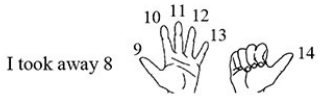
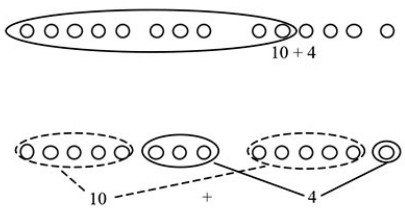
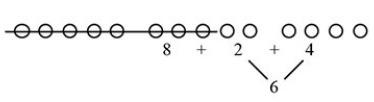
Appendix. Methods used for solving single-digit addition and subtraction problems

Level 1. Direct Modeling by Counting All or Taking Away.

Represent situation or numerical problem with groups of objects, a drawing, or fingers. Model the situation by composing two addend groups or decomposing a total group. Count the resulting total or addend.

Adding ($8 + 6 = \square$): Represent each addend by a group of objects. Put the two groups together. Count the total. Use this strategy for Add To/Result Unknown and Put Together/Total Unknown.

Subtracting ($14 - 8 = \square$): Represent the total by a group of objects. Take the known addend number of objects away. Count the resulting group of objects to find the unknown added. Use this strategy for Take From/Result Unknown.

Levels	**8 + 6 = 14**	**14 – 8 = 6**
Level 1: Count all	Count All 	Take Away 
Level 2: Count on	Count On 	To solve 14 – 8 I count on 8 + ? = 14  8 to 14 is 6 so 14 – 8 = 6
Level 3: Recompose Make a ten (general): one addend breaks apart to make 10 with the other addend Make a ten (from 5's within each addend)	Recompose: Make a Ten 	14 – 8: I make a ten for 8 + ? = 14  8 + 6 = 14
Doubles ± *n*	6 + 8 = 6 + 6 + 2 = 12 + 2 = 14	

Note: Many children attempt to count down for subtraction, but counting down is difficult and error-prone. Children are much more successful with counting on; it makes subtraction as easy as addition.

Common Misconceptions

● Students might double count a number when adding or subtracting (For example, starting with the 6 when adding 4 to get 6, 7, 8, 9 rather than 10.)

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 rehearses prior learning when studying add and subtract within 20 because the foundation of this cluster is to understand that counting leads to understanding addition and subtraction. Students can practice counting forward and/or backward from a given number. This can be a group activity.

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

- K.CC. A2: Counting to tell the number of objects, is the prior standard. This standard provides a foundation for work with adding and subtracting numbers within 20 because it provides the understanding that you can a given number of objects within 20. 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 adding and subtracting within 20, benefit when learning experiences include ways to recruit interest such as providing choices in their learning (ex. which strategy to use, and what tools to use) because students will reflect on what strategies they understand and can utilize the best. This promotes autonomy of student learning, metacognition, while increasing fluency in the topic.

Build

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

- For example, learners engaging with adding and subtracting within 20 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 the purpose of this standard it to increase fluency using strategies chosen by the student. It is important for students to receive feedback on the strategy they chose and whether it was effective and why or why not. Sample tasks for this standard can be found at: http://tasks.illustrativemathematics.org/1.OA.C-2

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 adding and subtracting within 20 benefit when learning experiences attend to the linguistic and nonlinguistic representations of mathematics to ensure clarity can comprehensibility for all learners such as allowing for flexibility and easy access to multiple representations of notation where

appropriate (e.g., formulas, word problems, graphs) because students might need different modalities to demonstrate understanding such as use of counters, ten frames, number bonds, or mental math strategies.

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 adding and subtracting within 20 benefit when learning experiences attend to the multiple ways students can express knowledge, ideas, and concepts such as providing scaffolds that can be gradually released with increasing independence and skills (e.g., embedded into digital programs) because the overall goal of this standard is to increase student fluency through understanding.

Internalize

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

- For example, learners engaging with adding and subtracting within 20 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 incorporating explicit opportunities for review and practice because this skill will be used in later advanced math skills. See Recognizing Repetition (link below). As students gain fluency, this opens paths for more critical thinking.
  http://www.fosteringmathpractices.com/routinesforreasoning/recognizing-repeptition/

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 add and subtract within 20 by critiquing student approaches/solutions to make connections through a short mini-lesson because students need to know that counting objects leads to the total number of objects given. This is a foundational skill to adding numerical amounts.

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 on add and subtract within 20 by addressing conceptual understanding because they need to connect the idea of counting objects in groups and adding to what they have already counted without starting from 1.

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 opportunity to understand concepts more quickly and explore them in greater depth than other students when studying adding and subtracting within 20 because students may be ready for larger numbers by using units of 10 or previously learned strategies. This is also related to the next standard in the progression.

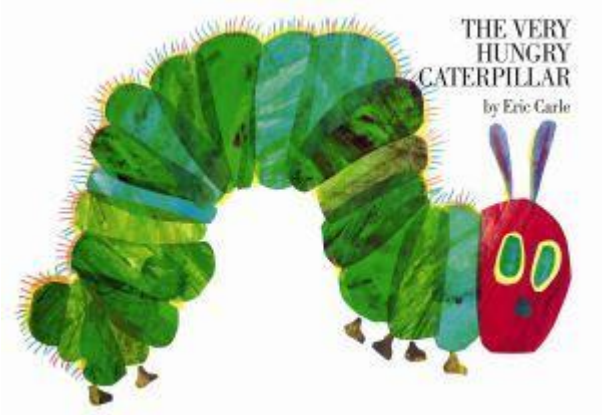
Culturally and Linguistically Responsive Instruction:

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?

Task: When planning with your HQIM consider how to modify tasks to represent the prior experiences, culture, language and interests of your students to "portray mathematics as useful and important in students' lives and promote students' lived experiences as important in mathematics class." Tasks can also be designed to "promote social justice [to] engage students in using mathematics to understand and eradicate social inequities (Gutstein 2006)." For example, when studying adding and subtracting within 20 the types of mathematical tasks are critical because it allows students flexibility to work within components of their own culture and language. They can use their home language skills to help understand what the problem is asking. Students can also choose items such as counters lines or methods of counting that might be available in the home setting.

Standards Aligned Instructionally Embedded Formative Assessment Resources:
The Very Hungry Caterpillar
Provided by Illustrative Mathematics
Materials

- The Very Hungry Caterpillar by Eric Carle



- The students work individually or in pairs. Each student or pair needs:
- Three ten-frames for each student or pair of students (download PDF for black line master)
- 30 counters or unifix cubes per pair of students
- One small dry-erase board and dry-erase maker per pair of students

Actions
The teacher reads the book to the class and asks, "How many things do you think the caterpillar ate in this story?" The students take a minute to share their estimate with a partner. Next, the teacher reads The Very Hungry Caterpillar again. After each page, the teacher pauses so that the students can add counters or unifix cubes to the ten-frame to represent the number of things the caterpillar ate, and then write an equation on the dry-erase board connecting addition to the number of counters used. After each ten-frame is filled in the students move to the next one. If the students are working in pairs, one student can add the counters/unifix cubes to the ten-frame while the other student writes the equation. By the end of the story, there should be a total of 25 food items eaten and 1 leaf eaten. (The students can decide as a class whether to count the leaf as a food). There will be two ten-frames completed with 5 or 6 counters/unifix cubes on the third ten-frame. If students come up with different, but correct, equations, then discuss the different equations and ask students, "Can all of these be correct?"

<table>
<tr><td colspan="2">This type of assessment question requires students to solve word problems that call to relate counting on to addition (1.OA.5)
https://achievethecore.org/coherence-map/1/5/39/39</td></tr>
<tr><td>Relevance to families and communities:

During a unit focused on adding and subtracting within 20, 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, count, add and subtract in your home language. Use items from around the house to model addition and subtraction problems.</td><td>Cross-Curricular Connections:

Science: In first grade the NGSS state students should "make observations at different times of year to relate the amount of daylight to the time of year.” Consider providing a connection for students to find the difference in the number of hours daylight during different times of the year.

Language Arts: Letters or digraphs are something that students can count. Consider providing a connection where students “hunt” for particular letters or digraphs on 2 different pages of their reading book and then add or subtract to find the total or difference, being mindful that all answers are within 20.</td></tr>
</table>