2.MD: MEASUREMENT & DATA

Cluster Statement: Relate addition and subtraction to length.

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.MD.B.5: Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) 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 interpreting and solving word problems involving lengths using manipulatives or drawings. SMP 4: Students can model with mathematics by applying addition and subtraction to solve problems.	• Recognize that when adding or subtracting lengths, the measurement units must be the same. • Represent measurement problems using drawings and equations. • Solve length word problems by adding or subtracting measurements within 100. • Write an equation for a word problem involving length and represent the unknown number with a symbol. **Depth of Knowledge: 2** **Bloom's Taxonomy:** Remember, Apply and Evaluate
Standard Text 2.MD.B.6: Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.	**Standard for Mathematical Practices** SMP 2: Students can reason abstractly and quantitatively by representing whole numbers and whole number sums and differences on a number line diagram. SMP 4: Students can model with mathematics by using a number line diagram to solve addition and subtraction problems.	**Students who demonstrate understanding can:** • Create a number line to show whole numbers using equally spaced marks. • Represent addition and subtraction problems on a number line diagram. • Solve addition and subtraction problems using a number line diagram.

		Depth of Knowledge: 1-2
		Bloom's Taxonomy: Remember, Understand and Apply
Previous Learning Connections • Connect to using open number lines to add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10. (**1.NBT.4)**	**Current Learning Connections** • Connect to solving one- and two-step measurement problems. **(2.OA.1)** • Connect to using open number lines to add and subtract within 1000. Connect to understanding number lines to include a distance model for subtraction. **(2.NBT.7)** • Connect to generating measurement data by measuring objects and showing the measurements on a line plot. **(2.MD.9)**	**Future Learning Connections** • Connect to understanding a fraction as intervals between whole numbers on a number line. **(3.NF.2)**

Clarification Statement:

2.MD.B.5: As an arithmetic example, students might measure all the sides of a table with unmarked (foot) rulers to measure how much ribbon they would need to decorate the perimeter of the table.

2.MD.B.6: To use a number line diagram to understand number and number operations, students need to understand that number line diagrams have specific conventions: the use of a single position to represent a whole number and the use of marks to indicate those positions. They need to understand that a number line diagram is like a ruler in that consecutive whole numbers are 1 unit apart, thus they need to consider the distances between positions and segments when identifying missing numbers.

Common Misconceptions

● Students may have misconceptions about how to express the way they solved a problem using an equation.

● Students may not understand they could jump by more than ones on a number line to add or subtract.

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 and relating addition and subtraction to length because it helps with students' understanding by allowing and helping them make connections to the new information. Students can access their schema and experiences to understand the relationship of addition and subtraction to length.

Pre-teach (intensive): *What critical understandings will prepare students to access the mathematics for this cluster?*
▪ 1.MD.A.1: Order three objects by length; compare the lengths of two objects indirectly by using a third object. This standard provides a foundation for work with relating addition and subtraction to length because students need to understand comparing to help with addition and subtraction using length measurements. 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 relating addition and subtraction to length benefit when learning experiences ensure information is accessible to learners through a variety of methods for navigation, such as physically interacting with materials by hand because using a ruler to measure or add/subtract is more concrete and hands-on than looking at picture of a ruler and trying to measure or add/subtract.

Build

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

- For example, learners engaging with relating addition and subtraction to length benefit when learning experiences attend to students attention and affect to support sustained effort and concentration such as providing feedback that is frequent, timely, and specific because it allows for students to make mistakes, figure out how to fix their mistakes, learn new strategies, and allows for peer interactions to enhance learning.

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 relating addition and subtraction to length 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. Pre-teaching vocabulary gives students the opportunity to identify words and then be able to place them in context and remember them and apply it to what they are working on.

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 relating addition and subtraction to length benefit when learning experiences attend to the multiple ways students can express knowledge, ideas, and concepts such as providing text-to-speech software (voice recognition), human dictation, recording because while students may be able to solve a math equation and have the skill set to do so, some students may be low literacy readers and by removing the stress of reading the equation they can focus on solving the equation.

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 relating addition and subtraction to length 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 visuals such as graphic organizers are a helpful learning tool for students of all ages to organize, clarify, or simplify complex information—they help

students construct understanding through an exploration of the relationships between concepts. They also are a useful scaffold to support student learning.

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 relating addition and subtraction by providing specific feedback to students on their work through a short mini lesson because providing students with meaningful feedback can greatly enhance their learning and achievement. Re-teaching by providing students with information on what exactly they did well, and what may still need improvement.

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 relating addition and subtraction to length by confronting student misconceptions because students will shut down if they think they are doing it wrong. Focusing on the facts and why 'right is right' gives them the detailed steps again to follow to get the answer right. We help them and re-teach them until they get the steps right.

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 in-depth, self-directed exploration of self-selected topics when studying and relating addition and subtraction to length because it gives students opportunities to teach themselves new skills of how to learn and apply to other content areas. Self-selected topics and learning can improve thinking skills, research skills, self-management skills, social skills, and communication skills and allows for further independent practice.

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?

Tasks: The type of mathematical tasks and instruction students receive provides the foundation for students' mathematical learning and their mathematical identity. Tasks and instruction that provide greater access to the mathematics and convey the creativity of mathematics by allowing for multiple solution strategies and development of the standards for mathematical practice lead to more students viewing themselves mathematically successful capable mathematicians than tasks and instruction which define success as memorizing and repeating a procedure demonstrated by the teacher. For example, when studying and relating addition and subtraction to length the types of mathematical tasks are critical because with the increasing diversity in our classrooms, it is important for teachers to implement culturally relevant pedagogy and challenge students since these tasks are the basis of opportunity for students to learn.

Standards Aligned Instructionally Embedded Formative Assessment Resources:
Source: http://tasks.illustrativemathematics.org/content-standards/2/MD/B/6/tasks/1081
This type of assessment question requires students to understand number lines can be used to represent sums from addition and or differences from subtraction. SMP 2, reason abstractly and quantitatively is important because students make sense of quantities and how they are related in a problem situation. During this process, students periodically contextualize the problem by connecting the mathematical symbols back to the context.

You could use this task to inform and adjust instruction if necessary. This task allows you to assess students' understanding of the number line as tool to help solve problems. It can also assess their understanding of equations and 2 different equations being equal even if addends are different (3+5 = 2+6)

Relevance to families and communities:	Cross-Curricular Connections:
During a unit focused on relating addition and subtraction to length, 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, learning about the different ways you can measure items in your home and community and then compare lengths (adding/subtracting) is a great way to connect schools tasks with home tasks. To ensure students have the opportunity to engage in high-level thinking and culturally relevant tasks, teachers must select and implement tasks that promote reasoning and problem solving (lower-level tasks are classified as memorization and procedures without connections to understanding, meaning or concepts. Both represent limited opportunities for students to understand important concepts.	Science: In second grade the NGSS states students should "plan and conduct an investigation to determine if plants need sunlight and water to grow." Consider providing a connection for students to measure plant growth and then pose addition and subtraction problems within the context of their growth. Language Arts: Literature can offer connections about measurement such as: *How Big is a Foot* by Rolf Myller and *If You Hopped Like a Frog* by David Schwartz.