3.MD: MEASUREMENT & DATA

Cluster Statement: A: Solve problems involving measurement and estimation.

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:
3.MD.A.1: Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.	SMP 1: Students can make sense of problems and persevere in solving them by interpreting, analyzing, and solving word problems involving elapsed time using number line diagrams or other strategies. SMP 6: Students can attend to precision by accurately reading and writing time to the nearest minute. SMP 7: Students can look for and make use of structure by applying the patterns and structures of analog and digital clocks, such as there are 5 minutes between each marked number, to write and tell time.	• Recognize minute marks on an analog clock and minute position on a digital clock f • Write time to the nearest minute • Tell time to the nearest minute • Find elapsed time in minutes using a number line diagram • Solve word problems involving elapsed time in minutes by using a number line diagram **Depth of Knowledge:** 1-2 **Bloom's Taxonomy:** Remember, Understand and Apply
Standard Text 3.MD.A.2: Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.	Standard for Mathematical Practices SMP 1: Students can make sense of problems and persevere in solving them by interpreting, analyzing, and solving word problems involving liquid volume and mass. SMP 5: Students can use tools to estimate and measure to solve liquid volume and mass word problems. SMP 6: Students can attend to precision by using appropriate mathematical language and	Students who demonstrate understanding can: • Estimate and measure liquid volumes using standard units of liters (l) • Solve one-step word problems involving liquid volume given in the same units • Estimate and measure masses of objects using standard units of grams(g) and kilograms (kg) • Solve one-step word problems involving masses given in the same units • Represent a word problem involving liquid volume or mass using various strategies

	abbreviations as they name units of measurement (grams, kilograms, & liters).	**Depth of Knowledge:** 1-2
		Bloom's Taxonomy: Understand, Apply and Analyze
Previous Learning Connections	**Current Learning Connections**	**Future Learning Connections**
• Connect to telling and writing time from analog and digital clocks to the nearest 5 minutes using AM and PM. (**2.MD.7**)	• Connect to understanding a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; and understanding a fraction a/b as the quantity formed by a parts of size 1/b. **(3.NF.1)** • Connect to solving two-step word problems using the four operations; and **r**epresenting these problems using equations with a letter standing for the unknown quantity. Connect to assessing the reasonableness of answers using mental computation and estimation strategies including rounding. **(3.OA.8)**	• Connect to recording measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36). (**4.MD.1**) • Connect to multiplying or dividing to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. **(4.OA.2)** • Connect to using the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Connect to representing measurement quantities using diagrams such as number line diagrams that feature a measurement scale. **(4.MD.2)**

Clarification Statement:
In this standard, students reason about the units of length, capacity and weight using customary units. Students need to develop a basic understanding of the size and weight of customary units and apply this understanding when estimating and measuring.
Students are not expected to convert between units. The focus is on measuring and also reasoning as they estimate, using benchmarks to measure length, weight, and capacity.

Word problems should only be one-step and include the same unit. The number range for these tasks should match the number size described in the OA and NBT standards

Common Misconceptions
● Students might overgeneralize the base-10 structure and apply it to time, such as changing 1 hour 15 minutes to minutes as 115 minutes or 25 minutes

● Students may believe that a larger object automatically has more mass.

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 solving problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects because students are building on previous knowledge from earlier grades where they described , measured, estimated, and compared amounts, using standard units of measurement as well as non-standard units such as scoops or cups to measure liquids. Students are also building on previous knowledge from earlier grades in telling and writing time to the nearest hour and half hour.

Pre-teach (intensive) *What critical understandings will prepare students to access the mathematics for this cluster?*
- 2.MD.a.1: This standard provides a foundation for work with solving problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects because students will be using measurement and estimation to solve problems. 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 solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects benefit creating an accepting and supportive classroom climate because students need to feel safe and supported in their environment so they are willing to take risks and make mistakes so they can do their best learning. If students feel supported and safe then they know they can approach math in a way that makes sense to them and are supported by their teacher and peers. Activities or tasks are chosen to foster the use of imagination, to solve novel and relevant problems, or to make sense of complex ideas in creative ways.

Build
Effort and Persistence: *How will the learning for students provide options for sustaining effort and persistence?*
- For example, learners engaging with solving problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects benefit when learning experiences attend to student's attention and affect to support sustained effort and concentration such as encouraging and supporting opportunities for peer interactions and supports (e.g., peer-tutors) because using flexible grouping gives students the opportunity to ask questions, ask for clarification, or encourage one another through coaching and the use of questioning when

students get stuck. Students working in groups are encouraged to persevere and are celebrated for their thinking and effort. Students may use different strategies to solve problems involving time, liquid volumes, and mass. Students may use different manipulatives but are still exploring finding the solution to the problem. Talking with peers provides opportunities for students to sustain their effort and perseverance.

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 solving problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects 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 it's important for students to have an understanding of important mathematical vocabulary so it doesn't impede their learning during the lesson. Before the lesson begins, the teacher may break down the objectives and use pictures, examples, or different words to pre teach vocabulary and symbols. This gives the students background knowledge and helps students make connections to their own experiences and prior knowledge.

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 solving problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects benefit when learning experiences attend to the multiple ways students can express knowledge, ideas, and concepts such as solving problems using a variety of strategies because it allows for students to solve the problem in a way that makes sense to them and allows them to be able to talk about their thinking and their strategy when solving real world problems involving time, liquid volume, and mass.

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 solving problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects 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 asking questions to guide self-monitoring and reflection because it is important for students to ask themselves questions as they learn and reflect on their learning. If students are consistently doing this then they know whether they understand or are still struggling with the concept.

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 solving problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects by providing specific feedback to students on their work through a short mini-lesson because students may need more time exploring measurement and working with what units they are using to measure objects and why. Students also may need more time exploring reading time. As the students explore, the teacher gives them specific feedback to help clear up misconceptions.

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

- For example, students may benefit from re-engaging with content during a unit on solving problems involving measurement and estimation of intervals of time, liquid volumes, and masses

of objects by confronting student misconceptions in a small group setting or pull out if needed. In a smaller group setting, the teacher will be able to monitor students' progress on a biweekly basis to assess student growth and their responses to intensive interventions.

Extension

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

- For example, some learners may benefit from an extension such as the opportunity to explore links between various topics when studying solving problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects because students can make connections between different types of measurement and how they are used in the real world and across different topics.

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?

Posing Purposeful Questions: CLRI requires intentional planning around the questions posed in a mathematics classroom. It is critical to consider "who is being positioned as competent, and whose ideas are featured and privileged" within the classroom through both the types of questioning and who is being questioned. Mathematics classrooms traditionally ask short answer questions and reward students that can respond quickly and correctly. When questioning seeks to understand students' thinking by taking their ideas seriously and asking the community to build upon one another's ideas a greater sense of belonging in mathematics is created for students from marginalized cultures and languages. For example, when studying solving problems involving measurement and estimation of intervals of time, liquid volumes, and mass of objects the pattern of questions within the classroom is critical because these purposeful questions are used to guide students and advance students' reasoning and make sense about important mathematical ideas and relationships. Students having access to funneling and focusing questions gives them the support they need to be successful. When students have access to purposeful questions in the classroom, students understand that the teacher or their peers are seeking to understand their thinking by taking their ideas seriously and asking the community to build upon one another's ideas a greater sense of belonging in mathematics is created for students from marginalized cultures and languages.

Standards Aligned Instructionally Embedded Formative Assessment Resources:
Sources: Cognia Testlet for Grade 3 Measurement and Data
3.MD.A.1 Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.
Learning Target: I can show how to solve telling time word problems by reading a clock and adding and subtracting minutes. DOK: 2

1. Look at this clock.

a. What time does the clock show?

Carter is meeting Zachary in 23 minutes.

b. At what time is Carter meeting Zachary? Show your work or explain how you know.

The clock shows the time that Carter finished reading an article. He spent 30 minutes reading the article.

c. At what time did Carter start reading the article? Show your work or explain how you know.

Relevance to families and communities:	**Cross-Curricular Connections:**
During a unit focused on measurement, 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 structures for the different units of measurement across the languages in your classroom can lead to a more robust understanding of units used for measurement for all students by making connections to the different structures of units of measurement used in other countries. Relate the metric system to the countries of origin of your students.	Science: In third grade the NGSS recommends students work with data related to weather conditions. Consider providing a connection for students to collect and measure the amount of rain during different seasons. Language Arts**:** When students have independent reading time during school or at home, consider having them track when they started and ended and using this as the context for elapsed time problems.