2.MD: MEASUREMENT & DATA

Cluster Statement: D: Represent and interpret data.

Supporting 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.)
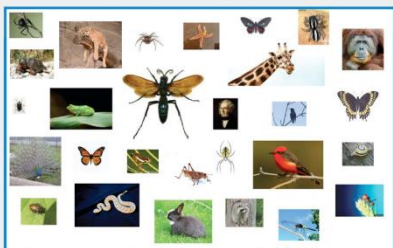
Standard Text	Standard for Mathematical Practices	Students who demonstrate understanding can:
2.MD.D.9: Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.	SMP 4: Students can model with mathematics by using a line plot to organize and represent their data. SMP 5: Students can use tools by generating measurement data to the nearest whole unit using rulers, yardsticks, meter sticks and measuring tapes.	• Measure and record the lengths of several objects to the nearest whole-number. • Create a line plot with a horizontal scale marked off in whole-number units. • Record length measurements on a line plot.
		Depth of Knowledge: 2
		Bloom's Taxonomy: Remember, Apply and Analyze
Standard Text 2.MD.D.10: Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simply put-together, take-apart, and compare problems using information presented in a bar graph.	**Standard for Mathematical Practices** SMP 1: Students can make sense of problems and persevere in solving them by applying what they know about put-together, take-apart, and compare problems to information presented in a bar graph**.** SMP 2: Students can reason abstractly and quantitatively by making sense of the quantities counted in each category in picture and bar graphs.	**Students who demonstrate understanding can:** • Collect data representing up to 4 categories • Draw a picture graph and a bar graph. • Answer questions regarding graphs up to 4 categories. • Solve simply put-together, take-apart and compare problems using the information presented in a bar graph.

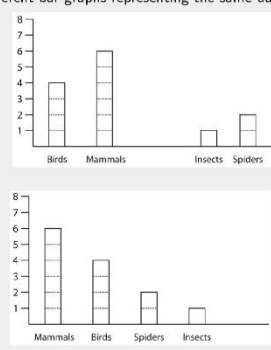|	SMP 4: Students can model with mathematics by using a picture or bar graph to organize and represent a data set with up to four categories.	**Depth of Knowledge:** 2
		Bloom's Taxonomy: Understand, Apply and Analyze
Previous Learning Connections • Connect to developing the skills to accurately measure objects using non-standard units of measure **(1.MD.2)** • Connect to organizing and represent data in ways that make sense to students and asking and answering questions about the data. **(1.MD.4)**	**Current Learning Connections** • Connect to solving simply put-together, take-apart, and compare problems. **(2.OA.1)** • Connect to other measurement work, as the count scale in a bar graph is a segment of a number line diagram and can be used to represent sums and differences. **(2.MD.6)**	**Future Learning Connections** • Connect to collecting and representing measurement data to include fractions. **(3.MD.4)**

Clarification Statement:

2.MD.D.10:

The illustration shows an activity in which students make a **bar graph** to represent **categorical data**, then **solve addition** and **subtraction** problems based on the data.

Common Misconceptions
● Students may think marking X's on the line plot in different sizes means different quantities.

● Students may not understand how the graph represents the data they collected.

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 representing and interpreting data by generating measurement data by measuring the lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object and show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units and drawing picture and bar graphs to represent a data set with up to four categories because students may need practice in generating categories, reading a tape measure, ruler, yardstick, or meterstick. Students also may need to be explicitly guided to the concept that a line plot with a horizontal scale is like what they used in prior grades as a number line with whole number units.

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

▪ K.MD.B.3: This standard provides a foundation for work with drawing picture and bar graphs to represent a data set with up to four category because students must be capable of first categorizing items to be able to successfully draw picture graphs and bar graphs to represent the data set with up to four categories . 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 interpreting data by generating measurement data by measuring the lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object and show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units and drawing picture and bar graphs to represent a data set with up to four categories benefit when learning experiences include ways to recruit interest such as providing contextualized examples to their lives because as students have contextualized examples of how measurement and data are relevant outside the classroom in a real-world aspect, the learning will be more meaningful.

Build

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

▪ For example, learners engaging with representing and interpreting data by generating measurement data by measuring the lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object and show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units and drawing picture and bar graphs to represent a data set with up to four categories benefit when learning experiences attend to students attention and affect to support sustained

effort and concentration such as generating relevant examples with students that connect to their cultural background and interests because children come from a variety of backgrounds and interests. A student from an agricultural background may see the relevance of measurement data within the context of land or produce, while a student who is interested in constructing, may see the validity of measurement in the form of building, etc.

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 interpreting data by generating measurement data by measuring the lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object and show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units and drawing picture and bar graphs to represent a data set with up to four categories benefit when learning experiences attend to the linguistic and nonlinguistic representations of mathematics to ensure clarity can comprehensibility for all learners such as making connections to previously learned structures because a second grader has been exposed to number lines and can extend that previously learned structure to the creation of a line plot, where the horizontal scale is marked off in whole-number units.

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 interpreting data by generating measurement data by measuring the lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object and show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units and drawing picture and bar graphs to represent a data set with up to four categories 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., pre-made number lines that gradually lead to self-created number lines) because second graders' fine motor skills are not always developed to independently construct straight lines with equidistant horizontal scales.

Internalize

Self-Regulation: *How will the design of the learning strategically support students to effectively cope and engage with the environment?*

- For example, learners engaging with representing and interpreting data by generating measurement data by measuring the lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object and show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units and drawing picture and bar graphs to represent a data set with up to four categories benefit when learning experiences set personal goals that increase ownership of learning goals and support healthy responses and interactions (e.g., learning from mistakes), such as offering devices, aids, or charts to assist students in learning to collect, chart and display data about the behaviors such as the mathematical practices for the purpose of monitoring and improving because second graders are new to the mathematical skills involved in measurement and charting data. Students may require multiple opportunities in this cluster to master the desired learning goal.

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 interpreting data by generating measurement data by measuring the lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object and show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units and drawing picture and bar graphs to represent a data set with up to four categories by providing specific feedback to students on their work through a short mini-lesson because often students do not attend to precision when reading measurements on a ruler, tape measure, yardstick, or meterstick. Students need reinforcement that they are correctly and accurately reading measurements to be successful in this cluster. Students must be shown often where to begin and end the measurement when using the tools; for example, students often begin reading at the beginning of the tool instead of where the 0 mark is indicated.

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 representing and interpreting data by generating measurement data by measuring the lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object and show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units and drawing picture and bar graphs to represent a data set with up to four categories by confronting student misconceptions because each standard within this cluster necessitates attending to precision. Students may need one-on-one instruction or peer-tutoring to successful read measurement tools. They may also require additional time and practice to accurately read measuring tools. Students may need differentiated scaffolding in the creation of line plots and bar graphs, perhaps beginning with a template and working toward individual construction of the line plot or bar graph with a horizontal scale marked off in whole-number units.

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 representing and interpreting data by generating measurement data by measuring the lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object and show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units and drawing picture and bar graphs to represent a data set with up to four categories because some students are naturally prone to investigate data. Students could measure more objects as they predict which items would be the same measurement or the same difference of measurement from other objects investigated.

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?

Facilitating Meaningful Mathematical Discourse: Mathematics discourse requires intentional planning to ensure all students feel comfortable to share, consider, build upon and critique the mathematical ideas under consideration. When student ideas serve as the basis for discussion we position them as knowers and doers of mathematics by using equitable talk moves students and attending to the ways students talk about who is and isn't capable of mathematics we can disrupt the negative images and stereotypes around mathematics of marginalized cultures and languages. "A discourse-based mathematics classroom provides stronger access for every student — those who have an immediate answer or approach to share, those who have begun to formulate a mathematical approach to a task but have not fully developed their thoughts, and those who may not have an approach but can provide feedback to others." For example, when studying representing and interpreting data by generating measurement data by measuring the lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object and show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units and drawing picture and bar graphs to represent a data set with up to four categories facilitating meaningful mathematical discourse is critical because as learners are given the opportunity to have connections with real-life situations in which measurement and data can be used in a variety of situations without the negative images and stereotypes around mathematics, they are validating that this skill is legitimate in all cultures. Students may experience many ways that measurement is used from the units (feet, inches, yards, meters, centimeters) to tasks such as sewing, carpentry, design. Line plots, picture graphs, and bar graphs to represent a data set is not only useful in academia, but also in business and society.

Standards Aligned Instructionally Embedded Formative Assessment Resources:
Source: http://tasks.illustrativemathematics.org/content-standards/2/MD/D/9/tasks/493
This type of assessment question requires students to measure and record growth data accurately.
This task allows you to assess student's ability to measure using standard tool. This activity also assesses student's ability to add an unknown (new growth since last measurement) to find total height.

Relevance to families and communities:	**Cross-Curricular Connections:**
During a unit focused on representing and interpreting data by generating measurement data by measuring the lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object and show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units and drawing picture and bar graphs to represent a data set with up to four categories, 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 mathematics used within the different careers of your family and community can provide a strong connections between school and careers.	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 record and analyze their data. Social Studies: In second grade the New Mexico Social Studies Standards state students should "compare similarities of the history of peoples in North America through literature (e.g., story-telling, fables, folktales, fairy tales)". Consider providing a connection for students to compare these similarities by displaying and analyzing the data.