

1.MD: MEASUREMENT & DATA

Cluster Statement: C: 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

1.MD.C.4: Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

Standard for Mathematical Practices

SMP 2: Students can reason abstractly and quantitatively by making sense of the data and answering questions about it.

SMP 4: Students can model with mathematics by collecting and using data to answer questions about their everyday lives.

SMP 6: Students can attend to precision by organizing and representing data.

Students who demonstrate understanding can:

- Organize a given data set with up to three categories into a chart or other display.
- Ask and answer questions about data points.
- Compare data from up to three categories.

Depth of Knowledge: 2, 3

Bloom's Taxonomy:
Apply, Analyze and Evaluate

Previous Learning Connections

- Connect to classifying objects into given categories and sorting the categories. Connect to counting the number of objects in each category and understanding the relationship between numbers and quantities in order to answer questions about how many up (to 20). **(K.MD.3) (K.CC.3-5)**

Current Learning Connections

- Connect to using addition and subtraction within 20 to solve word problems that may use up to three whole numbers. **(1.OA.1-2)** Using tally marks to represent data collected provides an opportunity to have more practice with groups of tens and ones.

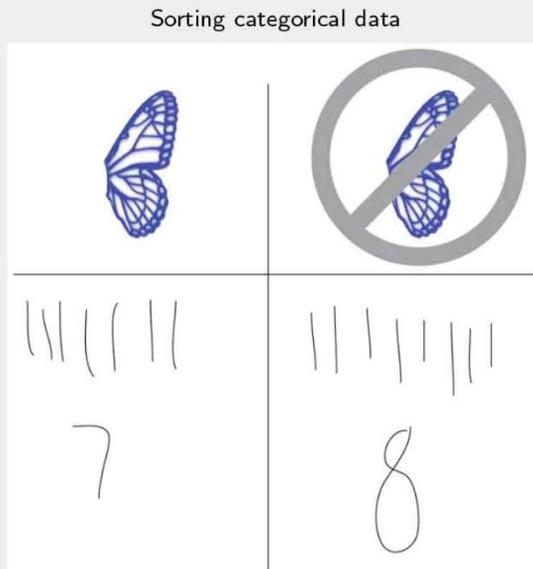
Future Learning Connections

- Connect to representing a data set with up to four categories by drawing a picture graph and a bar graph with single-unit scale. **(2. MD.10)**

Clarification Statement:

- 1.MD.C.4: Students' **data** work in Grade 1 has important connections to **addition** and **subtraction**. Students in grade 1 can ask and answer questions about **categorical data** based on a **representation** of the data. Students can also ask and answer questions leading to other kinds of addition and subtraction problems (1. OA), such as **compare problems** or problems involving the addition of three numbers (for situations with three categories).

There is no single correct way to represent categorical data—and the Standards do not require Grade 1 students to use any specific format. However, students should be familiar with **mark schemes** like the one shown in the figure. Another format that might be useful in Grade 1 is a **picture graph** in which one picture represents one object. (Note that picture graphs are not an expectation in the Standards until Grade 2.)



The marks represent individual data points. The two category counts, 7 and 8, are a numerical summary of the data.

Common Misconceptions

- Students may incorrectly read or record data when transferring between different displays.
- Students may pose a question that is too open-ended or has too many choices.
- Students may not collect data from more than one person to answer the questions.

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 new mathematical language when studying the skill of being able to organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another because students are working with new mathematical vocabulary words that include, category, categories, and data for example. It is important to ensure that students have a clear understanding of these new math terms as they work to solve problems associated with being able to represent and interpret data.

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 students being able to classify objects and count the number of objects in each category because it will then

set up the foundation of students to be able to count correctly, and associate a given total to a specific category. As students' progress in first grade, they will be expected to work within a maximum of three categories and be able to identify totals, and one more or one less of an amount in any given category. 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 being able to represent and interpret data 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 displaying information in a flexible format to vary perceptual features. This can include larger and more visible categories to represent data, graphs and charts that are easy to read without conflicting colors, and easily recognizable symbols to demonstrate values in a chart because all students should have the same access to understanding, inferring and solving questions related to the data presented in the chart. Students may recognize the categories listed and the data that is being represented in each.

Build

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

- For example, learners engaging with being able to represent and interpret data benefit when learning experiences attend to students attention and affect to support sustained effort and concentration such as creating cooperative learning groups with clear goals, roles, and responsibilities because when students have opportunities to communicate with peers they can cooperatively set goals and learn from each other. This allows students to build on their knowledge and teach their peers.

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 being able to represent and interpret data benefit when learning experiences attend to the linguistic and nonlinguistic representations of mathematics to ensure clarity can comprehensibility for all learners such as making all key information available in English also available in first languages (e.g., Spanish) for English Learners and in ASL for learners who are deaf, because it is necessary for all learners to be able to access data points, categories and symbols related to being able to interpret data with up to three categories.

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 being able to represent and interpret data 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 students can express their understanding in numerous ways especially when they have a variety of strategies to pull from. Students can improve

their depth of knowledge by learning new strategies and approaching problems in different ways.

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 able to represent and interpret data 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 elevating the frequency of self-reflection and self-reinforcements because when students are given the opportunity to do self-reflect they can identify where their understanding is and where they might need more support to clear up misconceptions. Students should be able to self-reflect as they organize, represent and interpret data within given categories in order to be able to ask and answer questions.

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 being able to organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another by clarifying mathematical ideas and/or concepts through a short mini-lesson because students will be able to receive intervention on the skills associated with organizing, representing and interpreting data within up to three categories. This is important because it can clear up any misconception's students may have either associated with the categories or data that are being represented, as well as any mathematical counting errors of one more or one less of a category.

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 in which they are able to organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another by helping students move from specific answers to generalizations for certain types of problems because students will be exposed to data in multiple ways as they continue with first grade and prepare for second grade concepts. Students gain new understanding that data exists all around them and with cross-curricular topics and can be used to organize data points and information into categories, and based on that organization it allows for students to make meaning of data and information while comparing the totals of various categories.

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 explore links between various topics when studying the skill of being able to organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another because this allows students to make connections related to data and connections. When given choice

and the opportunity to explore topics of choice related to this mathematical skill, students may be more engaged in the work and in making connections related to the organization and representation of data. Also, students are given the opportunity to see more real-world connections associated with data, categories, recognizing one more or one less and being able to compare categorical values.

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?

Using and Connecting Mathematical Representations: The standard for mathematical practice, use appropriate tools strategically, provides a strong foundation to validate and bridge for students. Mathematical representations are mathematical tools. The linguistic and cultural experiences of students provide different and varied types of representations for solving mathematical problems. By explicitly encouraging students to use multiple mathematical representations students can draw on their "mathematical, social, and cultural competence". By valuing these representations and discussing them we can connect student representations to the representations of school mathematics and build a bridge for students to position them as competent and capable mathematicians. For example, when studying the math skill on being able to organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another the use of mathematical representations within the classroom is critical because students are transitioning and learning more representations of math through the use of data and categories. Students may also be utilizing symbols when interpreting data and can even bring in their own symbols related to their culture when creating data. Students can build a bridge between mathematics and culture, along with language as they interpret data and answer questions related to the data and information provided. Also, students can represent not only their learning, but category information as well to make cultural connections and build on this skill.

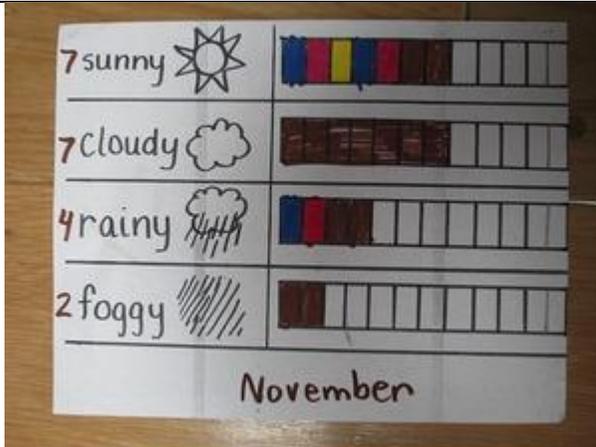
Standards Aligned Instructionally Embedded Formative Assessment Resources:

Source: <https://achievethecore.org/coherence-map/1/3/13/13>

Weather Graph Data

Materials

- Completed monthly weather recording sheet



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- Crayons
- Sentence strips with frames (see below)
- Student worksheet

Actions

Every day for a month the students records the weather by shading in an appropriate box on the recording sheet (attached).

At the completion of a month of school, the teacher projects the completed recording sheet using a document projector (if working with the whole class) or shows it to the students (if working in a small group setting).

The teacher asks the students to count how many days in the month each type of weather occurred, writing the number by the type of weather.

The teacher or another student asks questions like these:

How many rainy days did we have this month?

How many more rainy days did we have than sunny days?

How many days did we record the weather?

Students compose answers to the questions using sentence frames like these:

In September there were ___ days

There were ___ more days than ___ days

There were ___ fewer days than ___ days

We recorded ___ days of weather altogether.

Both numbers and types of weather are used to fill in the blanks. Students pair up and share an idea for each sentence frame; then the teacher chooses a student to fill in one of the frames orally, while it is recorded onto the sentence frame.

The students copy the data from the recording sheet onto their worksheet to create their own graph. The teacher may need to model this for the students the first time they do it.

The students choose a sentence based on the completed frames to match each of the weather pictures given. So, for the sunny picture a student could write, "There were 5 more sunny days than rainy days," or "There were 12 sunny days in September." The frame of "We recorded ___ days of weather altogether" could be stated orally, or added at the bottom of the recording sheet to be filled in. The teacher may need to model this for the students the first time they do it.

This type of assessment question requires students to represent and interpret weather data, as well as answer questions about the data they have recorded. Teachers could modify this task to include the most common weather in their local area.

Relevance to families and communities:

During a unit focused on 1.MD.C, represent and interpret data, 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 number names across the languages in your classroom can lead to a more robust understanding of number for all students by making connections to the different structures of number-names in other languages.

Cross-Curricular Connections:

Language Arts: Consider providing an opportunity for students to survey each other regarding the books they are reading (favorite book, favorite character, what do you think will happen next) and then graph and analyze the results.

Physical Education: Consider providing an opportunity for students to time or count the number of reps they can do for a certain fitness task (sprint, sit-ups, jumping jacks) and then graph and analyze the results.