New Mexico Instructional S
Algebra 2 Interpreting Categorical Dat
Quantitative Data Gui

The purpose of this tool is to help educators understand each of the grade level standards and how those standards connect to the students' overall preparation for college and career readiness.

The NMIS is a teacher-influenced tool, designed to provide instructional planning support at the programmatic level for districts and instructional level for teachers. Its foundation stems from the vision and mission of the PED and came into existence to assure that students in NM will be engaged in a culturally and linguistically responsive educational system that meets the social, emotional, and academic needs of ALL students. This is also rooted in the belief that all students must have access to on-grade-level standards, focusing on acceleration. The purpose of this tool is to help educators understand each of the grade level standards and how those standards connect to the students' overall preparation for college and career readiness.

Standards are defined as the most critical prerequisite skills and knowledge. This document is color-coded to reflect both anchor and priority standards. Though previous emphasis was placed on priority standards to address lost learning due to COVID-19, New Mexico teachers should note that moving forward, while priority standards allow for acceleration of learning, **all** standards should be addressed in instruction throughout the school year.

In this guide you will find:

- A breakdown of each of the grade level standards within the cluster, including:
  - Standards of Mathematical Practice
  - Common Misconceptions
  - Identification of Priority Standards, as identified by NMPED.
  - Level of Rigor Identification
- Sample aligned assessment items
- Suggested Student Discourse Guide
- A multilayered system of supports (MLSS) and culturally and linguistically responsive instruction (CLR) guide

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Key		
	Priority Standard	Priority standards, as identified by NMPED, are denoted with red highlighting. Priority standards are the most critical prerequisite skills and knowledge a student needs. This does not mean that these are only standards required to be taught, just these are the standards that will allow for the acceleration the students of New Mexico need during this time.
	*Conceptual Understanding*	Conceptual Understanding standards help students build a deep understanding of the **how** and **why** of mathematics.
	*Application*	Application standards help students identify the appropriate concepts and skills to tackle **novel real-world problems.**
	*Procedural Skill and Fluency*	Procedural standards help students develop **efficiency** and **accuracy** in computations.

Standards Breakdown

- Summarize, represent, and interpret data on a single count or measurement variable
  - HSS.ID.A.4

Grade	*CCSS Domain*	*CCSS Cluster*
A2	**Interpreting Categorical & Quantitative Data**	**Summarize, represent, and interpret data on a count or measurement variable**

Cluster Standard: HSS.ID.A.4

Standard	**Standards for Mathematical Practice**
Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	• **SMP 2:** Reason abstractly and quantitatively. • **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 7:** Look for and make use of structure. • **SMP 8:** Look for and express regularity in repeated reasoning.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• At this level, students are not expected to fit **normal curves** to data. (In fact, it is rather complicated to rescale data plots to be **density plots** and then find the best fitting curve.) Instead, the aim is to look for broad **approximations**, with application of the rather rough "**empirical rule**" (also called the 68%–95% Rule) for distributions that are somewhat **bell-shaped**. The better the bell, the better the approximation. Using such approximations is partial justification for the introduction of the **standard deviation**.	• Explain data distributions: when the data is normal, mean and standard deviation are used to represent the data; when data is skewed, median and Interquartile Range (IQR) are used to represent the data. • Explain why normal distribution can be used to estimate population percentages. • Estimate areas under a normal curve. • Calculate mean, median (Q2), standard deviation, IQR (Q1 & Q3). • Calculate z- score based on mean and standard deviation. • Use the empirical rule to understand area under the distribution • Apply this knowledge to estimate population percentages. • Use real world data to determine distributions.
DOK	**Blooms**
1-4	Remember, Understand, Apply, Analyze, Evaluate

Common Misconceptions

- Students may believe all data follows a normal distribution because of prior work with a sampling distribution of means.

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Student Discourse Guide

- Purposeful, rich classroom discourse offers students the opportunity to express their ideas, thi critique the reasoning of others in a variety of ways (writing, drawing, verbal). Purposeful imple classroom discourse allows students to activate funds of knowledge and to refine their mathematical understanding. When students have frequent opportunities for discourse they find various path and reveal knowledge or misunderstandings to educators. The process also allows educators to culture, lived experiences and evolving math identities.
- Discourse that focuses on tasks that promote reasoning and problem solving is a primary mec developing conceptual understanding and meaningful learning of mathematics (Michaels, O'C Resnick, 2008)

Domain: Interpreting Categorical & Quantitative Data	Strand: Summarize, represent, and interpret data single count or measurement variable

Suggested Student Discourse Questions

- In what ways are the mean, median, and m represented in the population of _____
- Which strategy (calculator, spreadsheet, ta are you using? In what ways does it repres data in the same manner as (student's nam strategy? In what ways is it different?
- How is using a calculator different from a spreadsheet or a table?
- How can this be used to estimate the popul of _____? (elk in the forest, people in th high school students in NM, COVID positive cases in the USA, etc)

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ASSESSMENT GUIDE

- Summarize, represent, and interpret data on a single count or measurement variable

Grade	*CCSS Domain*	*CCSS Strand*
A2	Interpreting Categorical & Quantitative Data	Summarize, represent, and interpret data on a count or measurement variable
	Sample Task #1 (Constructed Response)	
	Standards Aligned Instructionally Embedded Formative Assessment Resources: http://tasks.illustrativemathematics.org/content-standards/HSS/ID/A/4/tasks/1020 This type of assessment requires students to analyze a scenario approximately modeled by a normal distribution with given mean and standard deviation to make and support a statistical claim. Students will engage with SMP3 by making and supporting statistical claims. If students share their solutions with others, SMP3 can be further targeted by critiquing the solutions of peers.	

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MLSS AND CLR GUIDE

- Summarize, represent, and interpret data on a single count or measurement variable.

CCSS Domain	*CCSS Cluster*
Interpreting Categorical Data a Quantitative Data	Summarize, represent, and interpret data on a single count or mea variable

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on analyzing data, consider options for learning from your families and communities the cultural and linguistic ways mathematics exists outside of school to create stronger home to school connections for students. For example, learning about the different data analytical techniques helps provide a robust set of results which provide differing points of view. For example, mean and median of a data set can be used to estimate the symmetry of a curve, providing insight into the number of people that might be affected at the extremes of the population.	
Cross-Curricular Connections	Social Studies: In high school the New Mexico Social Studies Standards state students should "explain how to use technological tools to research data, verify facts and information, and communicate findings." Consider providing a connection for students to write a report describing and analyzing a specific set of data.	
Validate/Affirm/Build/Bridge	• *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?* • *How can you create connections between the cultural and linguistic behaviors of*	• Goal Setting: Setting challenging but attainable goals with students can communicate the belief and expectation that all students can engage with interesting and rigorous mathematical content and achieve in mathematics. Unfortunately, the reverse is also true, when students encounter low expectations through their interactions with adults and the media, they may see little reason to persist in mathematics, which can create a vicious cycle of low expectations and low achievement. For example, when studying HS.ID.A: Summarize, represent, and interpret data on a single count or measurement variable cluster, goal setting is critical because statistics are often used to help describe how a specific ethnic or cultural group is doing and what needs they may need. The census is the largest statistical tool the United States uses to help with this objective.

	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?	

Planning for Multilayered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
• Connect to work in previous math courses: when students learned to determine mean, median, mode, range, IQR, minimum, maximum. Students also learned how to graph data distributions (e.g., histograms, box plots).	• Connect students using this information to make inferences and justify conclusions from sample surveys, experiments and observational studies.	• Connect to future work students may do in subsequent statistics courses (AP or college level).

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	*Essential Question*	*Examples*
Targeted	*What pre-teaching will prepare students to productively struggle with the mathematics for this cluster within your HQIM?*	• Some learners may benefit from targeted pre-teaching that analyzes common misconceptions when summarizing, representing, and interpreting data on a single count or measurement variable because there are common misconceptions which learners often encounter. Addressing these misconceptions will often resolve issues that would otherwise have to be addressed in more time-

		consuming one-on-one instruction. • For example: Learners often misunderstand the meaning of range and standard deviation. Directly targeting this misconception can often allow students to move forward without time-consuming one-on-one instruction.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.: This standard provides a foundation for work with the Interpreting Categorical And Quantitative Data cluster because learners which don't understand the meaning and use of different types of data graphs will have difficulty interpreting them for meaning when solving 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.
Re-Teach		
Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on summarizing, representing, and interpreting data on a single Count or measurement variable by providing specific feedback to students on their work through a short mini-lesson because learners often get hung up on a single misconception or step. Clearing that step will often enable the learner to progress in solving the problem.
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 the Summarize, Represent, And Interpret Data On A Single Count Or Measurement Variable cluster by helping students move from specific answers to generalizations for certain types of problems because learners sometimes have difficulties with recall or have difficulty with the cognitive load of recalling and processing information spread out over one or more days. This is especially true when instruction is spread over weekends or breaks. Intensive Reteaching eases this cognitive load and empowers learners to

		accomplish the task.
Extension		
Essential Question		***Examples***
What type of extension will offer additional challenges to 'broaden' your student's knowledge of the mathematics developed within your HQIM?		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 how to summarize, represent, and interpret data on a single count or measurement variable. The non-Gaussian distribution is an example because there may be learners that need additional challenges beyond the curriculum.