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New Mexico Instructional Scope

7th Grade Statistics and Probability Guide

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

NEW MEXICO
Public Education Department

New Mexico Instructional Scope

7th Grade Statistics and Probability Guide

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

- Use random sampling to draw inferences about a population.
  - 7.SP.A.1
  - 7.SP.A.2
- Draw informal comparative inferences about two populations.
  - 7.SP.B.3
  - 7.SP.B.4
- Investigate chance processes and develop, use, and evaluate probability models.
  - 7.SP.C.5
  - 7.SP.C.6
  - 7.SP.C.7
  - 7.SP.C.8

NEW MEXICO
Public Education Department

New Mexico Instructional Scope
7th Grade Statistics and Probability Guide

Grade	*CCSS Domain*	*CCSS Cluster*
7	**STATISTICS & PROBABILITY**	**Use random sampling to draw inferences about a population.**

Cluster Standard: 7.SP.A.1

Standard	**Standards for Mathematical Practice**
Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.	• **SMP 2:** Reason abstractly and quantitatively. • **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 4**: Model with mathematics. • **SMP 5**: Use appropriate tools strategically.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students learn about sampling populations and that a sampling must be representative of the population in order to make valid inferences and generalizations. To measure variation and estimates or predictions about a characteristic, students must conduct multiple samples of the same size from populations with unknown characteristics	• Critique examples of sampling as statistical tools using precise mathematical vocabulary; random sampling, population, and valid generalization. • Design random samplings to collect the data given statistical questions. • Defend the samplings as random.
DOK	**Blooms**
1-2	Understand, Apply

NEW MEXICO
Public Education Department

New Mexico Instructional Scope
7th Grade Statistics and Probability Guide

Grade	*CCSS Domain*	*CCSS Cluster*
7	**STATISTICS & PROBABILITY**	**Use random sampling to draw inferences about a population.**

Cluster Standard: 7.SP.A.2

Standard	**Standards for Mathematical Practice**
Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be	• **SMP 2:** Reason abstractly and quantitatively. • **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 4**: Model with mathematics.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students learn about sampling populations and that a sampling must be representative of the population in order to make valid inferences and generalizations. To measure variation and estimates or predictions about a characteristic, students must conduct multiple samples of the same size from populations with unknown characteristics	• Draw valid inferences and generalizations from random samplings of populations • Justify their inferences and generalizations as valid using appropriate vocabulary • Explain the variability in multiple random samples and gauge how far off an estimate may be.
DOK	**Blooms**
1-2	Understand, Apply

Common Misconceptions

• Use random sampling to draw inferences about a population	• The concept of random is difficult for some students. It may be necessary to physically demonstrate a random vs a non-random sampling to eliminate misconceptions. For example, a non-random sampling would be to ask all girls to stand up to answer a question about video game

	preferences. A random sample would be to ask every third student to answer the same question. Ask students to compare and contrast answers for each example.

NEW MEXICO
Public Education Department

New Mexico Instructional Scope
7th Grade Statistics and Probability Guide

Grade	*CCSS Domain*	*CCSS Cluster*
7	**STATISTICS & PROBABILITY**	**Draw informal comparative inferences about two populations**

Cluster Standard: 7.SP.B.3

Standard	**Standards for Mathematical Practice**
Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable	• **SMP 5**: Use appropriate tools strategically. • **SMP 8**: Look for and express regularity in repeated reasoning.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• In this cluster students draw valid comparable inferences about two populations using measures of center (mean, median) and measures of variability (mean absolute deviation, interquartile range).	• Find measures of center and measures of variation for two or more data sets. • Compare two data sets for variability by comparing graphs. • Make inferences about data sets by comparing their statistical measures. • Model and compare two real-world data sets by measuring the difference between centers and expressing it multiple of a measure of variability
DOK	**Blooms**
1-2	Understand, Evaluate

NEW MEXICO
Public Education Department

New Mexico Instructional Scope
7th Grade Statistics and Probability Guide

Grade	*CCSS Domain*	*CCSS Cluster*
7	**STATISTICS & PROBABILITY**	**Draw informal comparative inferences about two populations**

Cluster Standard: 7.SP.B.4

Standard	Standards for Mathematical Practice
Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.	• **SMP 1**: Make sense of problems and persevere in solving them. • **SMP 6:** Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• In this cluster students draw valid comparable inferences about two populations using measures of center (mean, median) and measures of variability (mean absolute deviation, interquartile range).	• Draw valid comparative inferences about two populations. • Select the appropriate measure(s) of center (mean and median) or variability (MAD and IQR) when comparing two sets of data and justify that selection.
DOK	**Blooms**
1-2	Understand, Evaluate

Common Misconceptions

• Students may struggle with the key vocabulary utilized within this cluster. It will be important to emphasize vocabulary acquisition.	

NEW MEXICO
Public Education Department

New Mexico Instructional Scope
7th Grade Statistics and Probability Guide

Grade	*CCSS Domain*	*CCSS Cluster*
7	**STATISTICS & PROBABILITY**	**Investigate chance processes and develop, use, and evaluate probability models.**

Cluster Standard: 7.SP.C.5

Standard	**Standards for Mathematical Practice**
Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely or likely, and a probability near 1 indicates a likely event.	• **SMP 2**: Reason abstractly and quantitatively. • **SMP 7:** Look for and make use of structure.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This cluster focuses on probability and is the first-time students encounter this topic formally. Students learn the likelihood of chance events and approximate probabilities. They investigate chance using probability models they develop. The cluster begins with single events and builds up to finding the probability of compound events using tree diagrams, lists, tables, and simulations.	• In writing, express the likelihood of a chance event with a probability range from 0 to 1. • Recognize that the probability of any single event can be expressed with the terms impossible, unlikely, equally likely, likely, or certain. • Express probability as a fraction, decimal or percent
DOK	**Blooms**
1	Understand

NEW MEXICO
Public Education Department

New Mexico Instructional Scope
7th Grade Statistics and Probability Guide

Grade	*CCSS Domain*	*CCSS Cluster*
7	**STATISTICS & PROBABILITY**	**Investigate chance processes and develop, use, and evaluate probability models.**

Cluster Standard: 7.SP.C.6

Standard	**Standards for Mathematical Practice**
Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times	• **SMP 4**: Model with mathematics. • **SMP 8**: Look for and express regularity in repeated reasoning.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This cluster focuses on probability and is the first-time students encounter this topic formally. Students learn the likelihood of chance events and approximate probabilities. They investigate chance using probability models they develop. The cluster begins with single events and builds up to finding the probability of compound events using tree diagrams, lists, tables, and simulations.	• Collect data on chance events (hands-on events such as spinning a spinner and simulations) and approximate the relative frequency of an event given the probability. • Students recognize that as the number of trials increase, the relative frequency approaches the probability • Explain the difference between relative frequency and theoretical probability using appropriate language • Determine the sample space for a probability model
DOK	**Blooms**
2-3	Understand, Apply

NEW MEXICO
Public Education Department

New Mexico Instructional Scope
7th Grade Statistics and Probability Guide

Grade	*CCSS Domain*	*CCSS Cluster*
7	**STATISTICS & PROBABILITY**	**Investigate chance processes and develop, use, and evaluate probability models.**

Cluster Standard: 7.SP.C.7

Standard	Standards for Mathematical Practice
Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy **A**: Develop a uniform probability model by assigning equal probability to all outcomes and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected **B**:Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?	• **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 6**: Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This cluster focuses on probability and is the first-time students encounter this topic formally. Students learn the likelihood of chance events and approximate probabilities. They investigate chance using probability models they develop. The cluster begins with single events and builds up to finding the probability of compound events using tree diagrams, lists, tables, and simulations.	• Calculate the probability of a (simple) event as a fraction, decimal, or percent. • Determine the probability of events by developing uniform and non-uniform probability models (theoretical probability). • Compare the models to the observed frequency and explain their reasoning for any discrepancies between the model and the observed frequency using appropriate vocabulary. • Develop their understanding of probability by making predictions, comparing the predictions, replicating experiments, and comparing results.
DOK	**Blooms**

2-3	Apply, Analyze, Evaluate

NEW MEXICO
Public Education Department

New Mexico Instructional Scope
7th Grade Statistics and Probability Guide

Grade	*CCSS Domain*	*CCSS Cluster*
7	**STATISTICS & PROBABILITY**	**Investigate chance processes and develop, use, and evaluate probability models.**

Cluster Standard: 7.SP.C.8

Standard	Standards for Mathematical Practice
Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. **A**: Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. **B:** Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. **C:** Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 6:** Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This cluster focuses on probability and is the first-time students encounter this topic formally. Students learn the likelihood of chance events and approximate probabilities. They investigate chance using probability models they develop. The cluster begins with single events and builds up to finding the probability of compound events using tree diagrams, lists, tables, and simulations.	• Understand similarities and differences between compound events and simple events. • Find the sample space of a compound event. • Create organized lists, tables, tree diagrams, and simulations to find the probability of a compound event. • Represent the probability of a compound event as a fraction, decimal, or percent. • Design and use a simulation (using a random number table, calculator, dice, cards, or other manipulatives) to generate frequencies of compound events.

	• Justify their selection of a particular situation and explain how it models a compound event
DOK	**Blooms**
1-2	Understand, Apply

Common Misconceptions

• Relative frequency may be difficult to understand, students may want to express this as probability. Explain how probability helps determine the approximate relative frequency. • Reviewing and understanding vocabulary words is crucial for this standard. Use words frequently and have students discuss them during class discussion.	• Keeping lines straight when using tree diagrams can be difficult. Encourage students to use graph paper and a ruler in order to keep the outcomes apart from each other. There is a greater chance when students create lists randomly, they will miss one or more outcomes.

ASSESSMENT GUIDE

- Use random sampling to draw inferences about a population.
- Draw informal comparative inferences about two populations.
- Investigate chance processes and develop, use, and evaluate probability models

Grade	*CCSS Domain*	*CCSS Strand*
7	**STATISTICS & PROBABILITY**	**Use random sampling to draw inferences about a population.**

Sample Task #1 (Constructed Response)

Dustin randomly surveys 50 students about their favorite breakfast. He records the results in this table.

Breakfast Survey

Breakfast	Number of Votes
Pancakes	18
Waffles	13
Muffins	11
Other	8

There are 720 students at Dustin's school. Based on the survey results, which is the **best** estimate of the number of students who prefer pancakes?

Sample Task #2 (Multiple Choice)

Joan is the community leader of a group of people who want to pave a gravel road through town.

Which method of sampling the population of the community would result in the **most** unbiased opinion on whether or not to pave the road?

Ⓐ Joan holds a community meeting open to the public on a Monday morning and polls those who attend.

Ⓑ Joan asks the opinion of neighbors she sees on the street while taking her evening walks.

Ⓒ Joan sends questionnaires with return envelopes to all homeowners in the community.

Ⓓ Joan sends e-mails to everyone on a community e-mail list.

Grade	*CCSS Domain*	*CCSS Strand*
7	**STATISTICS & PROBABILITY**	**Draw informal comparative inferences about two populations**

Sample Task #1 (Constructed Response)

Suppose that your classmates were debating about whether going to college is really worth it. Based on the following data of annual salaries (rounded to the nearest thousands of dollars) for college graduates and high school graduates with no college experience, does it appear that going to college is indeed worth the effort? The data are from people in their second year of employment.

College Grad	41	67	53	48	45	60	59	55	52	52	50	59	44	49	52
High School Grad	23	33	36	29	25	43	42	38	27	25	33	41	29	33	35

a. Calculate the difference between the sample mean salary for college graduates and for high school graduates.

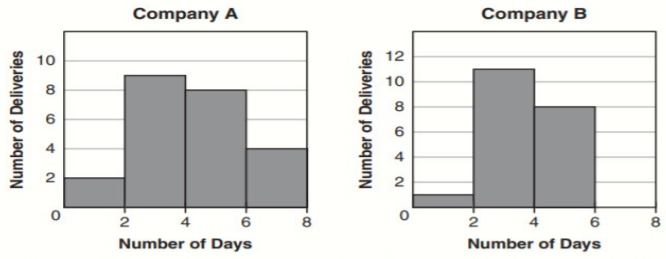
b. On the same scale, draw dot plots of the two distributions, and discuss the variability in each distribution.

c. Is the variability about the same?

d. Based on your calculations, is going to college worth the effort?

Sample Task #2 (Multiple Choice)

Kent is the owner of an online company. He uses two different companies to ship packages to customers. He takes a sample of deliveries to determine which company delivers in the fewest number of days. The results are shown in these histograms.



Based on the sample data, which statement about the two shipping companies is true?

Ⓐ Company A and Company B have the same range.
Ⓑ Company A and Company B have the same median.
Ⓒ Company A generally takes longer to deliver packages than Company B.
Ⓓ Company A had two deliveries that were faster than all of the deliveries for Company B.

NEW MEXICO
Public Education Department

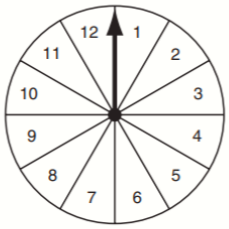
New Mexico Instructional Scope

7th Grade Statistics and Probability Guide

Grade	*CCSS Domain*	*CCSS Strand*
7	**STATISTICS & PROBABILITY**	**Investigate chance processes and develop, use, and evaluate probability models.**

Sample Task #1 (Constructed Response)

This spinner is divided into 12 equal sections.



The arrow on the spinner is spun once. What is the probability, written as a decimal, that the arrow will stop on a number **greater** than 9?

Sample Task #2 (Multiple Choice)

A bag contains 2 black marbles (B) and 1 white marble (W). Two marbles are taken from the bag at random, one at a time, without replacement. Which list represents the sample space for the possible outcomes?

Ⓐ WB
Ⓑ WB, BW
Ⓒ WB, BW, BB
Ⓓ WW, WB, BB

NEW MEXICO
Public Education Department

New Mexico Instructional Scope
7th Grade Statistics and Probability Guide

MLSS AND CLR GUIDE

- Use random sampling to draw inferences about a population.
- Draw informal comparative inferences about two populations.
- Investigate chance processes and develop, use, and evaluate probability models

CCSS Domain	*CCSS Cluster*
Statistics and Probability	**Use random sampling to draw inferences about a population**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	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? For example, when studying the use of random sampling to draw inferences about a population the types of mathematical tasks are critical because students come to our classrooms with Informal Knowledge/Funds of Knowledge.	
Cross-Curricular Connections	**Science:** Examining biological characteristics of a sample **Social Studies:** Population Sampling and Data Analysis	
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 your students' home culture and language, the culture and language 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 the use of random sampling to draw inferences about a population, goal setting is critical because it provides students opportunities to use mathematics to understand and investigate meaningful situations.

	school mathematics to support students in creating mathematical identities as capable mathematicians that can use mathematics within school and society?	

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
• In 6th grade, learners summarize quantitative data using quantitative measures of center and variability.	• In 7th grade, learners focus on the process of selecting a random sample, and the value of doing so.	• In high school, students make inferences and justify conclusions from sample surveys, experiments, and observational studies

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?*	For example, some learners may benefit from targeted pre-teaching that introduces new representations when studying using random sampling to draw inferences about a population because the idea of a random sample is a new concept for students. They need time to understand what a random sample is and what it is not before they are expected to make inferences based on one.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	*6.SP.A.1 This standard provides a foundation for work with using random sampling to draw inferences about a population because this standard is when students are introduced to a statistical question and the variability in data. 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?	Examine assessments for evidence of lingering misconceptions (see common misconceptions). If students exhibit one more of these misconceptions, consider addressing the misconception by re-engaging with content during a unit on using random sampling to draw inferences about a population by providing specific feedback to students on their work through a short mini lesson because students need to make sure that the random sample is in fact a random representation of a population before any inferences can be made about the population.
Intensive	What assessment data will help identify content needing to be revisited for intensive interventions?	Examine assessments for evidence of students still developing the underlying ideas as some students may benefit from intensive extra time during and after a unit using random sampling to draw inferences about a population by confronting student misconceptions because there is variability in estimations and predictions and how to gauge the difference. Also, the need for multiple random samples.

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?	To extend students learning, 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 using random sampling to draw inferences about a population because the concept of random sampling and applying it to make inferences about a population is a large concept. Being able to provide extra time for students to explore the samples, and the variability will help students in other clusters.

NEW MEXICO
Public Education Department

New Mexico Instructional Scope
7th Grade Statistics and Probability Guide

CCSS Domain	*CCSS Cluster*
Statistics and Probability	**Draw informal comparative inferences about two populations**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	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? During a unit focused on investigating chance processes and developing, using, and evaluating probability models, 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 about how probability is connected to games that families enjoy playing. Discussing how probability makes the games more or less interesting.
Cross-Curricular Connections	**Science and Technology:** Science and math are intimately connected, particularly in fields such as chemistry, astronomy and physics. Students who cannot master basic arithmetic skills will struggle to read scientific charts and graphs. More complex math, such as geometry, algebra and calculus, can help students solve chemistry problems, understand the movements of the planets and analyze scientific studies. Math is also important in practical sciences, such as engineering and computer science. Students may have to solve equations when writing computer programs and figuring out algorithms. Nursing majors may have great bedside manner. but they also need to know how to precisely calculate dosages to pass their courses. **Social Studies**: Social studies classes, such as history, often require students to review charts and graphs that provide historical data or information on ethnic groups. In geography classes, students might need to understand how the elevation of an area affects its population or chart the extent to which different populations have different average life spans. Knowledge of basic mathematical terms and formulas makes statistical information accessible **Literature and Writing**: Literature might seem like a far cry from math but mastering basic arithmetic can enable students to better understand poetry. The meter of poetry, the number of words to include in a line and the effect that certain rhythms have on the reader are all products of mathematical calculations. At a more mundane level, math can help students plan reading assignments in literature classes by discerning their average reading time and estimating how long it will take them to read a particular work. The linear, logical thinking used in mathematical

	problems can also help students write more clearly and logically. **Art/Music:** Students interested in pursuing careers in theater, music, dance or art can benefit from basic mathematical knowledge. Musical rhythm often follows complex mathematical series, and math can help students learn the basic rhythms of dances used in ballet and theater performances. Art thrives on geometry, and students who understand basic geometric formulas can craft impressive art pieces. Photographers use math to calculate shutter speed, focal length, lighting angles and exposure time	
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 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?*	• Building Procedural Fluency from Conceptual Understanding: Instruction should build from conceptual understanding to allow students opportunities to make meaning of mathematics before focusing on procedures. When new learning begins with procedures it privileges those with strong prior familiarity with school mathematics procedures for solving problems and does not allow learning to build for more methods for solving tasks that occur outside of school mathematics. For example, when studying drawing informal comparative inferences about two populations the types of mathematical tasks are critical because in this cluster of standards many of the ideas are new to students. We need to create learning opportunities that are focused on conceptual understanding as the entry point. We can build connections with students' cultures and languages as we purposefully work with students to use data that is relevant as they explore probability and develop models. This will also allow us to create opportunities for students to practice the situational appropriateness in the use of these mathematical principles in a variety of real-world situations.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
• In 6th grade, learners develop an	• This is an additional cluster, so the	• In future courses, learners will

understanding of graphs, mean, median, mode, Mean Absolute Deviation (M.A.D.) and interquartile range (IQR). In 6th grade, learners recognize there will be variability in the data of a statistical question and will account for it in the answers. In 6th grade, learners understand a data set has a distribution which can be described by its center, spread, and overall shape and can summarize numerical data sets by reporting the number of observations along with describing the nature of the attribute under investigation and how it was measured and its units.	connections between this cluster and other grade level clusters is limited to 7.SP.A and 7.SP.C that examine different aspects of Statistics & Probability	represent data with plots on the real number line (dot plots, histograms, and box plots). In future courses, learners will use statistics appropriate to the shape and context of the data distribution to compare measures of center (median, mean) and spread (IQR, standard deviation) of two or more different data sets. In future courses, learners will interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points.

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?*	For example, some learners may benefit from targeted pre-teaching that provides additional time for confusion to happen with new mathematical ideas when studying; Drawing informal comparative inferences about two populations because in previous clusters, students worked with one population
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	*7.SP.A.2: This standard provides a foundation for work with Drawing informal comparative inferences about two populations because why and how inferences and generalizations are made helps to justify reasoning. 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?	Examine assessments for evidence of lingering misconceptions (see common misconceptions). If students exhibit one more of these misconceptions, consider addressing the misconception by re-engaging with content during a unit on drawing informal comparative inferences about two populations by clarifying mathematical ideas and/or concepts through a short mini-lesson because students may not understand why it may be necessary to conduct multiple samples of the same size
Intensive	What assessment data will help identify content needing to be revisited for intensive interventions?	Examine assessments for evidence of students still developing the underlying ideas drawing informal comparative inferences about two populations by offering opportunities to understand and explore different strategies because students can organize by using lists, tables, tree diagrams, and simulations.
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?		To extend students learning about an opportunity to explore links between various topics when studying drawing informal comparative inferences about two populations because students can apply probabilities to real-life scenarios that link science disciplines for example, genetics and a Punnett square.

NEW MEXICO
Public Education Department

New Mexico Instructional Scope

7th Grade Statistics and Probability Guide

CCSS Domain	*CCSS Cluster*
Statistics and Probability	**Investigate chance processes and develop, use, and evaluate probability models**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	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? During a unit focused on Investigating chance processes and developing, using, and evaluating probability models, 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 how to interpret probability or design models can be used in their daily life and connecting these examples to the work within the classroom.	
Cross-Curricular Connections	**Science:** Make an argument on growth and development of organisms: animal reproductions, plant reproduction for specialized features. MS-LS1-4 • Develop a model and identify components. Describe relationships between components. Model data they create. Identify limitations of models. Describe how the data they generate can be used to create designs through testing and modification. Engineering Design Process. MS-ETS1-4 • Model genetic information and sexual reproduction results. Punnett squares. MS-LS3-2 Scatterplots of temperatures of water vs mass of ice added MS-PS3 • Model genetic information and sexual reproduction results. Punnett squares. MS-LS3-2 Use simulations to generate data that can be used to modify a proposed object, tool, or process MS-ETS1	
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*	• Building Procedural Fluency from Conceptual Understanding: Instruction should build from conceptual understanding to allow students opportunities to make meaning of mathematics before focusing on procedures. When new learning begins with procedures it privileges those with strong prior familiarity with school mathematics procedures for solving problems and does not allow learning to build for more methods for solving tasks that occur outside of school mathematics. For example, when studying Investigating chance processes and developing, using, and evaluating probability models, the types of mathematical tasks are critical because probability models are encountered in everyday life, especially seen in news reporting or studies that

	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?	students might see. With a little building of procedural fluency from conceptual understanding, students can understand probability meanings and interpret meanings on their own.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
• The 6.SP standards connect directly to this standard. In 6th grade, students approximated the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. Students also used ratio and rate reasoning to solve real-world and mathematical problems	• In 7th grade, students will recognize and represent proportional relationships between quantities. In 7th grade, students also use proportional relationships to solve multistep ratio and percent problems. These skills continue	• In 8th grade, learners construct and interpret a two-way table summarizing data on two categorical variables collected from the same subject. In high school, learners recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. In high school, learners find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	*Essential Question*	*Examples*
Targeted	*What pre-teaching will prepare students to*	For example, some learners may benefit from targeted pre-teaching that provides additional time for confusion

	productively struggle with the mathematics for this cluster within your HQIM?	to happen with new mathematical ideas when studying; Investigate chance processes and develop, use, and evaluate probability models because the probability model is first introduced in this grade level and students may get confused more easily.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	*6.RP.A.3: This standard provides a foundation for work with investigating chance processes and develop, use, and evaluating probability models because understanding ratio concepts and using ration reasoning to solve problems will help in solving probability models. 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?	Examine assessments for evidence of lingering misconceptions (see common misconceptions). If students exhibit one more of these misconceptions, consider addressing the misconception by re-engaging with content during a unit on investigation of chance processes and developing, using, and evaluating probability models by clarifying mathematical ideas and/or concepts through a short mini lesson because the probability model is first introduced in this grade level and students may need time to clarify the concept
Intensive	What assessment data will help identify content needing to be revisited for intensive interventions?	Examine assessments for evidence of students still developing the underlying ideas as some students may benefit from intensive extra time during and after a unit on investigation of chance processes and developing, using, and evaluating probability models by offering opportunities to understand and explore different strategies because students can find probabilities by using organized lists, tables, tree diagrams, and simulations
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?	To extend students learning: For example, some learners may benefit from an extension such as the opportunity to explore links between various topics when studying investigation of chance processes and developing, using, and evaluating probability models because students can apply probabilities to real-life scenarios that link science disciplines for example, genetics and a Punnett square.