NEW MEXICO

Public Education Department

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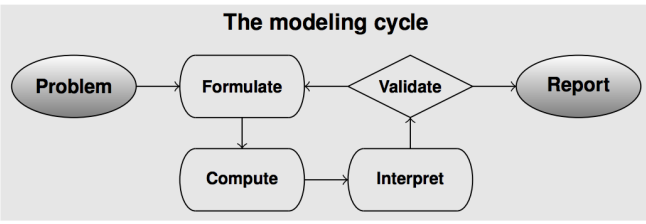- A breakdown of each of the grade level standards within the cluster, including:
  - Standards of Mathematical Practice
  - Common Misconceptions
  - Identification of Priority Standards, as identified by NMPED.
  - Level of Rigor Identification
- Sample aligned assessment items
- Suggested Student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

Key

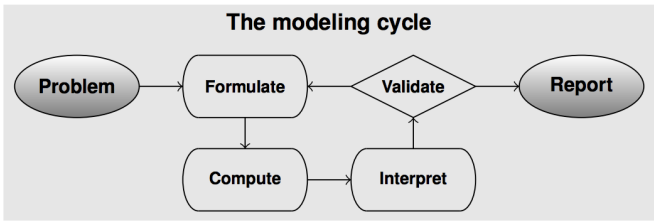|		
   	Priority Standard	Priority standards, as identified by NMPED, are denoted with red highlighting. Priority standards are the most critical prerequisite skills and knowledge a student needs. This does not mean that these are only standards required to be taught, just these are the standards that 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

- Create equations that describe numbers or relationships.
  - HSA.CED.A.1
  - HSA.CED.A.2
  - HSA.CED.A.3
  - HSA.CED.A.4

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Grade	CCSS Domain	CCSS Cluster
A2	Creating Equations	Create equations that describe numbers or relat[...]

Cluster Standard: HSA.CED.A.1

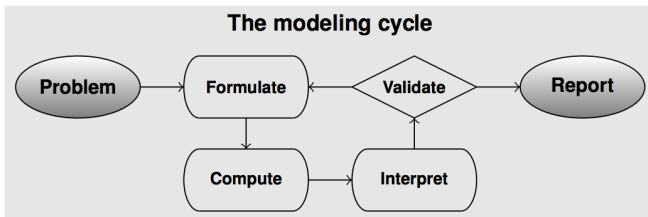| Standard	Standards for Mathematical Practice
Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions*.	● **SMP 1:** Make sense of problems and persevere in solving them. ● **SMP 4:** Model with mathematics.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
● Equations and inequalities can be created to represent and solve real world and mathematical problems. ● Students check their solutions to real-world problems which can be found by modeling them with equations and graphs. ● Constraints are necessary to balance a mathematical model with real-world context. Variable quantities may be able to take on only certain values and expressing these restrictions, or constraints, algebraically in an important part of modeling with mathematics. ● Formulas are equations with specific meaning that show the relationship between two or more quantities and are written in the same way literal equations are solved for a given variable, by isolating the desired variable on one side of the equation. ● All the standards in the Creating Equations group carry a modeling star, denoting their connection with the Modeling category in high school. This connotes not only an increase in the complexity of the equations studied, but an upgrade of the student's ability in every part of the modeling cycle.	● Create equations and inequalities in one variable and use them to solve problems. ● Write equations in one variable and use them to solve problems. ● Write inequalities in one variable and use them to solve problems.

The modeling cycle

DOK	Blooms
1-2	Understand, Apply, Analyze

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Grade	CCSS Domain	CCSS Cluster
A2	**Creating Equations**	Create equations that describe numbers or relat

🧠 Cluster Standard: HSA.CED.A.2

Standard	Standards for Mathematical Practice
HSA.CED.A.2: Create equations in two or more variables to represent relationships between quantities, graph equations on coordinate axes with labels and scales.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 4:** Model with mathematics.

Clarification Statement	Students Who Demonstrate Understanding Can...
• Equations and inequalities can be created to represent and solve real world and mathematical problems. • Students check their solutions to real-world problems which can be found by modeling them with equations and graphs. • Constraints are necessary to balance a mathematical model with real-world context. Variable quantities may be able to take on only certain values and expressing these restrictions, or constraints, algebraically is an important part of modeling with mathematics. • Formulas are equations with specific meaning that show the relationship between two or more quantities and are written in the same way literal equations are solved for a given variable, by isolating the desired variable on one side of the equation. • All the standards in the Creating Equations group carry a modeling star, denoting their connection with the Modeling category in high school. This connotes not only an increase in the complexity of the equations studied, but an upgrade of the student's ability in every part of the modeling cycle.	• Create equations in two or more variables based on a given context. • Write equations in two or more variables based on a given context. • Graph equations on coordinate axes with scales clearly labeling the axes, defining what the values on the axes represent and the unit of measure. • Select intervals for the scale that are appropriate for the context and display adequate information about the relationship. • Analyze points on and off a graph and interpret them in context.

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The modeling cycle

DOK	Blooms
1-2	Understand, Apply, Analyze

Grade	CCSS Domain	CCSS Cluster
A2	**Creating Equations**	Create equations that describe numbers or relati

Cluster Standard: HSA.CED.A.3

Standard	Standards for Mathematical Practice
Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*	• **SMP 2:** Reason abstractly and quantitatively. • **SMP 4:** Model with mathematics.

Clarification Statement	Students Who Demonstrate Understanding Can...
• Equations and inequalities can be created to represent and solve real world and mathematical problems. • Students check their solutions to real-world problems which can be found by modeling them with equations and graphs. • Constraints are necessary to balance a mathematical model with real-world context. Variable quantities may be able to take on only certain values and expressing these restrictions, or constraints, algebraically in an important part of modeling with mathematics.	• Identify constraints of equations, inequalities, and systems of equations and inequalities given a context. • Interpret solutions of equations, inequalities, and systems of equations and inequalities as viable or non-viable given a context. • Interpret solutions analytically and graphically to answer questions about the quantities in context.

- Formulas are equations with specific meaning that show the relationship between two or more quantities and are written in the same way literal equations are solved for a given variable, by isolating the desired variable on one side of the equation.
- All the standards in the Creating Equations group carry a modeling star, denoting their connection with the Modeling category in high school. This connotes not only an increase in the complexity of the equations studied, but an upgrade of the student's ability in every part of the modeling cycle.
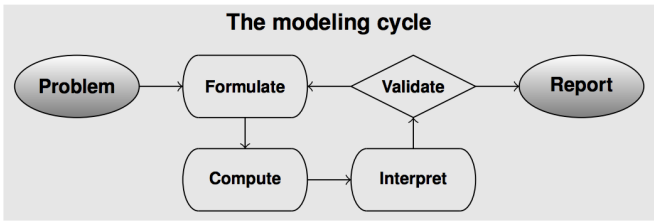
The modeling cycle

Problem → Formulate ↔ Validate → Report

Formulate → Compute → Interpret → Validate

DOK	Blooms
1-3	Understand, Apply, Analyze, Evaluate

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Grade	CCSS Domain	CCSS Cluster
A2	**Creating Equations**	Create equations that describe numbers or relatic

📋 Cluster Standard: HSA.CED.A.4

Standard	Standards for Mathematical Practice
Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*	**SMP4:** Reason abstractly and quantitatively. **SMP7:** Look for and make use of structure.

Clarification Statement	Students Who Demonstrate Understanding Can...
- Equations and inequalities can be created to represent and solve real world and mathematical problems. - Students check their solutions to real-world problems which can be found by modeling them with equations and graphs. - Constraints are necessary to balance a mathematical model with real-world context. Variable quantities may be able to take on only certain values and expressing these restrictions, or constraints, algebraically in an important part of modeling with mathematics. - Formulas are equations with specific meaning that show the relationship between two or more quantities and are written in the same way literal equations are solved for a given variable, by isolating the desired variable on one side of the equation. - All the standards in the Creating Equations group carry a modeling star, denoting their connection with the Modeling category in high school. This connotes not only an increase in the complexity of the equations studied, but an upgrade of the student's ability in every part of the modeling cycle.	Solve for a specified variable in a literal equation.

The modeling cycle

Problem → Formulate ⇄ Validate → Report

Formulate → Compute → Interpret → Validate

DOK	Blooms
1-2	Understand, Apply

Common Misconceptions

- Students may believe only linear and quadratic expressions can be used within inequalities.
- Students may believe that ellipses and hyperbolas are the same, but are reversed on the axis
- Students may believe absolute value cannot be inverted and struggle when there is more than one term inside absolute value
- Students may believe that midpoint and distance are the same thing and confuse the formulas.

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 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 students 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: **Creating Equations**	Strand: **Create equations that describe numbers relationships**
Suggested Student Discourse Questions	
• How can you simplify a rational function? Why or why not?	• How could you rearrange formulas to highlight a specific quantity? Solve for a specific unknown. For example A=LW, find width.

- Create an equation and inequality in one va
  How could you create an equation and ineq
  in one variable? How is your method differe
  from your partner?

- The challenge continues to examine US ce
  data to select and refine a model for the
  population of the United States over time. C
  to see if it is changing at a constant rate or
  equal proportional rates. How could the
  information from the table be used to mode
  linear or exponential function?

ASSESSMENT GUIDE

- [Create equations that describe numbers or relationships](#)

Grade	CCSS Domain	CCSS Strand
A2	**Creating Equations**	Create equations that describe numbers o relationships
	Sample Task #1 (Constructed Response)	

Source: https://satsuitequestionbank.collegeboard.org/

Question ID 19489

Assessment	Test	Cross-Test and Subscore	Difficulty	Primary Dimension	Secondary Dimension	Tertiary Dimension	Calculator
SAT	Math	Heart of Algebra	■□□	Heart of Algebra	Linear inequalities in one or two variables	1. Create and use linear inequalities in one or two variables to solve problems in a variety of contexts.	Calculator

19489

Wyatt can husk at least 12 dozen ears of corn per hour and at most 18 dozen ears of corn per hour. Based on this information, what is a possible amount of time, in hours, that it could take Wyatt to husk 72 dozen ears of corn?

Rationale

The correct answer is any number between 4 and 6, inclusive. Since Wyatt can husk at least 12 dozen ears of corn per hour, it will take him no more than $\frac{72}{12} = 6$ hours to husk 72 dozen ears of corn. On the other hand, since Wyatt can husk at most 18 dozen ears of corn per hour,

it will take him at least $\frac{72}{18} = 4$ hours to husk 72 dozen ears of corn.

Therefore, the possible times it could take Wyatt to husk 72 dozen ears of corn are 4 hours to 6 hours, inclusive. Any number between 4 and 6, inclusive, can be gridded as the correct answer.

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MLSS AND CLR GUIDE

- [Create equations that describe numbers or relationships](#)

CCSS Domain	CCSS Cluster
Creating Equations	Create equations that describe numbers or relationships

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on HS.CED.A: Create equations that describe numbers or relationships cluster, 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, how statistics are used to describe how the risk of different cultural and ethnic groups for developing breast cancer and how this might affect medical breast cancer screening frequency recommendations. Example: During a unit focused on creating equations in two variables, 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, exploring how changing the structure for an equation is similar to how a sentence can be re-structured to convey different meanings depending on the structure of the words.
Cross-Curricular Connections	Economics: Linear programming with a system of inequalities is often used to model the constraint of resources for production. Consider providing a connection where students are starting their own business and must maximize profit or production with the possible solutions of the system. Science: There are many formulas in science such as Ohm's Law and the Doppler formulas that may require isolating and solving for a specific variable given certain conditions. Consider providing a connection where students must rearrange the same formulas in multiple ways to highlight different quantities of interest.
Validate/Affirm/Build/Bridge	● *How can you design your mathematics classroom to intentionally and purposefully legitimize the home culture and*	● 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 hinders students with

| | | *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?* | strong prior familiarity with school mathematics procedures for solving problems from learning to build more methods for solving tasks that occur outside of school mathematics. For example, when studying HS.CED.A: Create equations that describe numbers or relationships cluster the types of mathematical tasks are critical because fluency in Algebra is akin to becoming fluent in a spoken or written language. Fluency is essential to obtaining a deep understanding of the function and meaning of any language. Algebra is no different. |

Planning for Multilayered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
● Connect to the work of Algebra 1 around linear, quadratic, and exponential (integer inputs only) with this cluster. **(HSA.CED.A)** ● Connect to graphing systems of equations and inequalities. **(HSA.REI.7)** ● Connect to solving equations in one variable including those equations with coefficients represented by variables. **(HSA.REI.3-4)**	● Connect to communicating relevant domain and range for linear, exponential and quadratic functions.**(HSF.IF.4)** ● Connect to graphing equations and inequalities.**(HSF.IF.7)** ●	● Connect to extending knowledge to include additional types of functions such as trigonometric, rational, and polynomial. **(HSA.CED.1-4)** ● Connect to communicating relevant domain and range for all types of functions. **(HSF.IF.4)**

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 focuses on creating equations that describe numbers or relationships because this cluster requires students to create equations they have already studied from relationships and contexts. A recap of the key features of the families of functions studied can help students more easily apply their prior learnings to these problems.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	8.F.B.4: This standard provides a foundation for work with creating equations that describe numbers or relationships because this standard called on students to specifically write linear equations from a given relationship and explain the parts of the equation in context of a scenario. 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.

Universal Support Framework

A student should know/understand...	A student should be able to do...	Potential Scaffolds
- Different forms of an expression can be equivalent and are useful in different contexts. - The addition, subtraction, multiplication, or division of rational expressions results in another rational expression. - When a situation and its potential constraints will be	- Use the structure of an expression and the properties of mathematics to rewrite it in a different form. - Perform the operations of addition, subtraction, multiplication, and division with rational expressions. - Determine	- Build on students' experience with the following skills: - Graphing on the coordinate plane (6.NS.C.8) - Solving systems of equations / inequalities (8.EE.C.8) - Adding / subtracting / multiplying / dividing and simplify fractions - Writing and solving one-step and two-step equations (HSA.REI.B.3, HSA.REI.B.4) - Modeling linear, exponential, quadratic and absolute value functions (HSF.LE.A, HSF.LE.B) - Different forms of linear (linear standard form, point-slope form, slope intercept

represented by all available types of equations/inequalities, including simple root function, or a system of those equations/inequalities.
● When solving graphically/with a table is more efficient than solving algebraically.
	reasonable solutions based on the context of real-world problems from graphs of equations/inequalities and systems of equations/inequalities.
	● Solve systems using a graph and a table as well as rewrite an equation as two functions (and vice versa).
		form) and quadratic equations (quadratic standard form and vertex form) ([HSF.LE.A](#))
		
		● Cognitive Strategies
		  ○ Repeatedly model the strategies
		  ○ Monitor the students' use of the strategies
		  ○ Provide feedback to students
		  ○ Teach self-questioning and self-monitoring strategies
		  ○ Introduce multiple means of representation for mathematical ideas
		
		● Encourage students to use alternative tools to better access the grade level content. Examples include:
		  ○ Desmos.com
		  ○ Graphing calculator
		  ○ Sketch a graph
		  ○ Create a table of values
		  ○ Algebra tiles
		  ○ Graphic organizers

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 creating equations that describe numbers or relationships by clarifying mathematical ideas and/or concepts through a short mini-lesson because students may see problems as having one specific solution when infinitely many solutions are appropriate. Students may benefit from revisiting contexts with inequalities and discussing many potential solutions and why they each make sense in context of the problem. Further, students may benefit from discussing why a solution can be found mathematically but why it may not make sense in context of a 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 creating equations that describe numbers or relationships by addressing conceptual understanding because students must have a

		firm grasp of the features of equations and inequalities before they can model scenarios with them. Students may require support in conceptualizing the different families of functions and/or the difference between an equation and an inequality.
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 open-ended tasks linking multiple disciplines when creating equations that describe numbers or relationships because once students are fluent in applying equations to contexts, they can be challenged by selecting their own problems relating to specific careers or interests.