New Mexico Instructional Scope

6th Grade Ratios and Proportional Relationships 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 Instructional Scope

6th Grade Ratios and Proportional Relationships 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

- Understand ratio concepts and use ratio reasoning to solve problems
  - 6.RP.A.1
  - 6.RP.A.2
  - 6.RP.A.3

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Grade	*CCSS Domain*	*CCSS Cluster*
6	**RATIO AND PROPORTIONAL RELATIONSHIPS**	**Understand ratio concepts and use ratio reasoning to solve problems.**

Cluster Standard: 6.RP.A.1

Standard	Standards for Mathematical Practice
Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.	● **SMP 6**: Attend to precision. ● **SMP 8:** Look for and express regularity in repeated reasoning.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
● Students are introduced to ratios, a relationship or comparison of two quantities or measures. They will represent ratios in various forms (a:b, a to b, a/b) and compare types of ratios. They will use reasoning about multiplication and division to solve ratio and rate problems about quantities. Students will learn how and where ratios and rates are used in the real world.	● Understand and explain that a ratio is a comparison of two quantities. ● Describe what a ratio illustrates using ratio language. ● Write a ratio relationship in the forms a:b, a to b, a/b. ● Translate a ratio relationship into words. ● Understand the differences between part: part and part: whole relationships.
DOK	**Blooms**
1-2	Understand, Apply

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Grade	*CCSS Domain*	*CCSS Cluster*
6	**RATIO AND PROPORTIONAL RELATIONSHIPS**	**Understand ratio concepts and use ratio reasoning to solve problems**

Cluster Standard: 6.RP.A.2

Standard	**Standards for Mathematical Practice**
Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship.	• **SMP 2:** Reason abstractly and quantitatively. • **SMP 4:** Model with mathematics. • **SMP 6:** Attend to precision. • **SMP 7:** Look for and make use of structure.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students are introduced to ratios, a relationship or comparison of two quantities or measures. They will represent ratios in various forms (a:b, a to b, a/b) and compare types of ratios. They will use reasoning about multiplication and division to solve ratio and rate problems about quantities. Students will learn how and where ratios and rates are used in the real world.	• Define a unit rate in relation to the concept of a ratio. • Represent units rates symbolically, in contexts, and through visuals. • Use precise language of unit rate to describe ratio relationships both orally and in writing.
DOK	**Blooms**
1-2	Understand, Apply

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Grade	*CCSS Domain*	*CCSS Cluster*
6	**RATIO AND PROPORTIONAL RELATIONSHIPS**	**Understand ratio concepts and use ratio reasoning to solve problems.**

Cluster Standard: 6.RP.A.3

Standard	Standards for Mathematical Practice
Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations	• **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 are introduced to ratios, a relationship or comparison of two quantities or measures. They will represent ratios in various forms (a:b, a to b, a/b) and compare types of ratios. They will use reasoning about multiplication and division to solve ratio and rate problems about quantities. Students will learn how and where ratios and rates are used in the real world.	• Create and interpret tables of equivalent ratios • Plot values from a table on a coordinate plane • Examine tables in order to compare ratios. • Solve real-world unit rate problems • Calculate the percent of a quantity as a rate per 100. • Reason with ratios to convert, manipulate and transform units of measure
DOK	**Blooms**
1-2	Understand, Apply

Common Misconceptions

- When working to solve ratio problems, students may run into confusion with the order of quantities (i.e: the ratio of triangles to squares requires students to write the quantity of triangles first as the numbers are not interchangeable). Students may have similar difficulties when understanding when to create a part-to-part ratio vs. a part-to-whole ratio

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Student Discourse Guide

- **Purposeful, rich classroom discourse offers students the opportunity to express their ideas, thinking, and to critique the reasoning of others in a variety of ways (writing, drawing, verbal). Purposeful implementation of 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 paths to solutions and reveal knowledge or misunderstandings to educators. The process also allows educators to honor students' culture, lived experiences and evolving math identities.**
- **Discourse that focuses on tasks that promote reasoning and problem solving is a primary mechanism for developing conceptual understanding and meaningful learning of mathematics (Michaels, O'Connor, and Resnick, 2008)**

Domain: **Ratio and Proportional Relationships**	Strand: **Understand ratio concepts and use ratio reasoning to solve problems.**

Suggested Student Discourse Questions

• How is your strategy different from (student's name)? • Compare different ways of writing ratios and explain what it means in the context of the problem.	• Can you relate using proportions to something within your personal life? • When writing a ratio, is order important? Does the numerator always come first when writing a ratio? • How does ratio describe the relationship between two quantities?

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ASSESSMENT GUIDE

- Understand ratio concepts and use ratio reasoning to solve problems

Grade	*CCSS Domain*	*CCSS Strand*
6	**Ratios and Proportional Relationships**	**Understand ratio concepts and use ratio reasoning to solve problems**

Sample Task #1 (Constructed Response)

Water is draining from a bucket with a hole in it. During a 10-minute period, the volume of water in the bucket decreases from 16 liters to 9 liters.

At what rate, in liters per minute, is the water draining from the bucket?

Sample Task #2 (Multiple Choice)

A recipe for banana bread uses 3 cups of flour for every 2 loaves of bread made. What is the ratio of cups of flour to 8 loaves of bread?

Ⓐ 5 : 8
Ⓑ 6 : 8
Ⓒ 12 : 8
Ⓓ 24 : 8

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MLSS AND CLR GUIDE

- Understand ratio concepts and use ratio reasoning to solve problems

CCSS Domain	*CCSS Cluster*
Ratio and Proportional Relationships	**Understand ratio concepts and use ratio reasoning to solve problems**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on understanding ratio concepts and using ratio reasoning to solve problems, 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 ratios used in the home and community can a be a great way to connect schools' tasks with home tasks.	
Cross-Curricular Connections	Science: ● Students can apply this to science by creating a ratio of the model of the solar system to the actual size of the solar system. In addition, students can use their knowledge of ratios to help them interpret the ratios of time, space, and energy to determine a ratio. MS-PS3-1 (Energy), MS-ESS1-3 (Earth's Place in the Universe) ○ https://www.nextgenscience.org/pe/ms-ps3-1-energy ○ https://www.nextgenscience.org/pe/ms-ess1-3-earthsplace-universe Social Studies: ● Students can apply the idea of ratios to social studies. They can determine ratios of populations and other types of ratios that are associated with their study of social studies	
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*	● Equity Based Practice (Facilitating Meaningful Mathematical Discourse): Mathematics discourse requires intentional planning to ensure all students feel comfortable to share, consider, build upon and critique the mathematical ideas under consideration. When student ideas serve as the basis for discussion, we position them as knowers and doers of mathematics by using equitable talk moves students and attending to the ways students talk about who is and isn't capable of mathematics, we can disrupt the

	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?*	negative images and stereotypes around mathematics of marginalized cultures and languages. "A discourse-based mathematics classroom provides stronger access for every student — those who have an immediate answer or approach to share, those who have begun to formulate a mathematical approach to a task but have not fully developed their thoughts, and those who may not have an approach but can provide feedback to others." For example, when studying understanding ratio concepts and using ratio reasoning to solve problems, facilitating meaningful mathematical discourse is critical because it improves students' reasoning abilities which builds their higher order thinking skills.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
• Connect students' previous understandings of conversion tables, graphing points, and how these ideas connect to the real world. These previous understandings will support students in their understanding of number relationships, specifically when comparing numbers. • In Grade 4, learners were taught to multiply or divide to solve word problems involving multiplicative comparison. In Grade 5, learners had to interpret a	• Connect student understandings of ratio relationships and number relationship as they move to use variables to represent two quantities that change in relationship to one another in the 6.EE.9 CCSS.	• Connect student understanding of ratios and rate from Grade 6 to compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. • These skills from this cluster are connected in Grade 7 when learners will recognize and represent proportional relationships between quantities. This includes student understanding of

fraction as division of the numerator by the denominator (a/b = a ÷ b) AND interpret multiplication as scaling or resizing. These skills will need to be explicitly reviewed to support student success with this domain		proportional relationships to solve multistep ratio and percent problems.

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 analyzes common misconceptions when studying understanding ratio concepts and use reasoning to solve problems because students need to understand the difference between ratio and fractions which is a huge misconception.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	This standard provides a foundation for work in this cluster because it is interpreting a fraction of which students need a solid foundation as to not confuse fractions and ratios. 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***
• A ratio is a comparison of two quantities. • The differences between part: part and part: whole relationships.	• Write ratio relationships in the forms a:b, a to b, a/b. • Solve ratio and rate reasoning problems with	• Build on students' experience with the following skills: ○ Understand conversion tables, graphing points ○ Multiply or divide involving multiplicative comparison. ○ interpret a fraction as division of the

• A unit rate compares two quantities with different units of measure. • A percent of a quantity is a rate per 100	tables, equivalent ratios, tape diagrams, double number line diagrams, or equations. • Solve and simplify unit rate problems. • Find the percent of a quantity and the whole given a part and a percent.	numerator by the denominator ○ interpret multiplication as scaling or resizing • 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: ○ Use of various types of manipulatives ■ Colored pencils ■ Multiplication chart ■ Manipulatives such as integer tiles

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 understanding ratio concepts and use ratio reasoning to solve problems by clarifying mathematical ideas and/or concepts through a short mini lesson because students often confuse ratios and fractions. By clarifying the ratio concepts, misconceptions will be reduced, and it will allow students to explore ratios.
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 understanding ratio concepts and use ratio reasoning to solve problems by addressing conceptual understanding because it allows students to attend to two quantities simultaneously. The students will be able to form a multiplicative comparison of two quantities and increase understanding of equivalent concepts.

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?	For example, some learners may benefit from an extension such as open-ended tasks linking multiple disciplines when studying understanding ratio concepts and use ratio reasoning to solve problems because open ended tasks that link multiple disciplines will allow students to make connections and broaden their understanding of the concept and when and where to use it. Thus, increasing higher order thinking skills.

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Standards Breakdown

- Apply and extend previous understandings of arithmetic to algebraic expressions.
  - 6.EE.A.1
  - 6.EE.A.2
  - 6.EE.A.3
  - 6.EE.A.4
- Reason about and solve one-variable equations and inequalities.
  - 6.EE.B.5
  - 6.EE.B.6
  - 6.EE.B.7
  - 6.EE.B.8
- Represent and analyze quantitative relationships between dependent and independent variables.
  - 6.EE.C.9

Grade	CCSS Domain	CCSS Cluster
6	EXPRESSIONS & EQUATIONS	Apply and extend previous understandings of arithmetic to algebraic expressions.

Cluster Standard: 6.EE.A.1

Standard	Standards for Mathematical Practice
Write and evaluate numerical expressions involving whole-number exponents	• **SMP 6:** Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• The focus for this cluster is writing and evaluating numerical expressions involving whole number exponents, finding the value of an expression using exponential notation such as 42= 4 x 4 or d 3 = d x d x d, and using the appropriate terminology to explain how to evaluate an expression. Students are applying the properties of operations to generate equivalent expressions including the distributive property to produce equivalent representation.	• Write and evaluate numerical expressions involving whole number exponents using the correct terminology • Evaluate numerical expressions using their knowledge of order of operations from previous years.
DOK	**Blooms**
2	Understand, Apply

Grade	CCSS Domain	CCSS Cluster
6	EXPRESSIONS & EQUATIONS	Apply and extend previous understandings of arithmetic to algebraic expressions.

Cluster Standard: 6.EE.A.2

Standard	Standards for Mathematical Practice
Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 - y **A:** Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 - y **B:** Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms **C:** Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s3 and A = 6 s2 to find the volume and surface area of a cube with sides of length s = ½	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 6**: Attend to precision.

Clarification Statement	Students Who Demonstrate Understanding Can...
• The focus for this cluster is writing and evaluating numerical expressions involving whole number exponents, finding the value of an expression using exponential notation such as 42= 4 x 4 or d 3 = d x d x d, and using the appropriate terminology to explain how to evaluate an	• Express orally and in writing that variables represent unknown quantities. • Write expressions using variables that represent unknown numbers. • Identify context to write algebraic expressions. • Translate verbal expressions into numerical

expression. Students are applying the properties of operations to generate equivalent expressions including the distributive property to produce equivalent representation.	expressions. ● Use information from real world examples to evaluate expressions with variables
DOK	**Blooms**
1-2	Understand, Apply

Grade	CCSS Domain	CCSS Cluster
6	EXPRESSIONS & EQUATIONS	Apply and extend previous understandings of arithmetic to algebraic expressions

Cluster Standard: 6.EE.A.3

Standard	Standards for Mathematical Practice
Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y	• **SMP 2:** Reason abstractly and quantitatively.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• The focus for this cluster is writing and evaluating numerical expressions involving whole number exponents, finding the value of an expression using exponential notation such as 42= 4 x 4 or d 3 = d x d x d, and using the appropriate terminology to explain how to evaluate an expression. Students are applying the properties of operations to generate equivalent expressions including the distributive property to produce equivalent representation.	• Create an equivalent expression through the use of properties of operations • Apply the distributive, commutative, identity, and distributives properties to expressions that include variables
DOK	**Blooms**
1-2	Understand, Apply

Grade	CCSS Domain	CCSS Cluster
6	EXPRESSIONS & EQUATIONS	Apply and extend previous understandings of arithmetic to algebraic expressions

Cluster Standard: 6.EE.A.4

Standard	Standards for Mathematical Practice
Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for	• **SMP 7:** Look for and make use of structure.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• The focus for this cluster is writing and evaluating numerical expressions involving whole number exponents, finding the value of an expression using exponential notation such as 42= 4 x 4 or d 3 = d x d x d, and using the appropriate terminology to explain how to evaluate an expression. Students are applying the properties of operations to generate equivalent expressions including the distributive property to produce equivalent representation.	• Identify equivalent expressions. • Combine like terms • Reason that two expressions are equivalent through the use of substitution
DOK	**Blooms**
1-2	Understand, Apply

Common Misconceptions

• When given an expression with an exponent, students may misinterpret the base and the exponent as factors and multiply the two numbers. For example, show that 5 x 3=15, which is much smaller than 5x5x5 which equals 125. • Students may use distributive property	• Students may misuse the commutative property by applying it to subtraction and/or division problems. • Students confuse variables with letters for units of measure.

incorrectly in that students will often multiply the first term, but forget to do the same to the second term.	

6	EXPRESSIONS & EQUATIONS	Reason about and solve one-variable equations and inequalities.

Cluster Standard: 6.EE.B.5

Standard	Standards for Mathematical Practice
Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively. • **SMP 4:** Model with mathematics.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students focus on the meaning of an equation and use reasoning and prior knowledge to solve it. They use variables to represent numbers and write expressions when solving problems. Students learn to write inequalities in the form of $x > c$, $x \geq c$, $x < c$ or $x \leq c$ and use number line representation to show the solutions of inequalities.	• Reason to find the single value that makes an equation true • Explain what a variable is representing in a particular situation or context • Use substitution to simplify numerical expressions and determine if the solution is true.
DOK	**Blooms**
2	Understand, Apply

6	EXPRESSIONS & EQUATIONS	Reason about and solve one-variable equations and inequalities.

Cluster Standard: 6.EE.B.6

Standard	Standards for Mathematical Practice
Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2**: Reason abstractly and quantitatively. • **SMP 7:** Look for and make use of structure.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students focus on the meaning of an equation and use reasoning and prior knowledge to solve it. They use variables to represent numbers and write expressions when solving problems. Students learn to write inequalities in the form of $x > c$, $x \geq c$, $x < c$ or $x \leq c$ and use number line representation to show the solutions of inequalities.	• Explain that a variable represents a number or a specified set of numbers. • Identify what the variable represents quantitatively and in context. • Represent real world scenarios with variable expressions.
DOK	**Blooms**
1-2	Understand, Apply

6	EXPRESSIONS & EQUATIONS	Reason about and solve one-variable equations and inequalities.

Cluster Standard: 6.EE.B.7

Standard	Standards for Mathematical Practice
Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively. • **SMP 7:** Look for and make use of structure.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students focus on the meaning of an equation and use reasoning and prior knowledge to solve it. They use variables to represent numbers and write expressions when solving problems. Students learn to write inequalities in the form of $x > c$, $x \geq c$, $x < c$ or $x \leq c$ and use number line representation to show the solutions of inequalities.	• Write and solve one step addition equations (x + p= q) when x, p and q are positive • Write and solve one step multiplication equations (px=q) form when x, p and q are positive. • Model real-world situations with equations
DOK	**Blooms**
1-2	Apply

6	EXPRESSIONS & EQUATIONS	Reason about and solve one-variable equations and inequalities.

Cluster Standard: 6.EE.B.8

Standard	Standards for Mathematical Practice
Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	• **SMP 1:** Make sense of problems and persevere in solving them. • **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 focus on the meaning of an equation and use reasoning and prior knowledge to solve it. They use variables to represent numbers and write expressions when solving problems. Students learn to write inequalities in the form of $x > c$, $x \geq c$, $x < c$ or $x \leq c$ and use number line representation to show the solutions of inequalities.	• Represent a real-world problem with an inequality ($x > c$ or $x < c$) • Explain that an inequality can have infinite solutions and show it on a number line. • Understand the difference between >, ≥, and <, ≤ and graphing with the appropriate open or closed circle.
DOK	**Blooms**
1-2	Apply

Common Misconceptions

• Students may have difficulty conceptualizing that an inequality can have more than one solution.	• Students may assume if there is no coefficient in front of the variable, then the variable does not have a value. They do not see that y=1y.

Grade	CCSS Domain	CCSS Cluster
6	EXPRESSIONS & EQUATIONS	Represent and analyze quantitative relationships between dependent and independent variables.

Cluster Standard: 6.EE.C.9

Standard	Standards for Mathematical Practice
Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively. • **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 4:** Model with mathematics. • **SMP 7**: Look for and make use of structure.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• The focus for this cluster is using variables to represent two quantities in a real-world problem that change in relationship to one another. Students write an equation and analyze the relationship between the dependent and independent variables using graphs and tables.	• Use variables to represent unknowns in a real-world problem and write an equation to show the relationship between two changing quantities. • Describe the variables in context of dependent and independent • Analyze the relationship between the dependent and independent variables using tables, graphs and equations
DOK	**Blooms**
1-3	Apply, Analyze

Common Misconceptions

• Students may confuse what the graph represents in context. For example, that moving up or down on a graph does not necessarily mean that a	• Students may reverse the independent and dependent variable in an equation, graph or table.

person is moving up or down.	

Student Discourse Guide

- **Purposeful, rich classroom discourse offers students the opportunity to express their ideas, thinking, and to critique the reasoning of others in a variety of ways (writing, drawing, verbal). Purposeful implementation of 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 paths to solutions and reveal knowledge or misunderstandings to educators. The process also allows educators to honor students' culture, lived experiences and evolving math identities.**
- **Discourse that focuses on tasks that promote reasoning and problem solving is a primary mechanism for developing conceptual understanding and meaningful learning of mathematics (Michaels, O'Connor, and Resnick, 2008)**

Domain: **Expressions and Equations**	Strand: **Apply and extend previous understandings of arithmetic to algebraic expressions.**

Suggested Student Discourse Questions

• Why do we use variables to represent different situations? • What would be the steps to create the algebraic expression?	• Can you create a real life or real world word problem to express understanding of algebraic expression? • What is an algebraic expression?

Domain: **Expressions and Equations**	Strand: **Reason about and solve one-variable equations and inequalities**

Suggested Student Discourse Questions

• How can I formulate and use different strategies to solve one-step equations? • Would a one-step equation yield the same solution if you reversed the inverse operations when solving it?	• What real life connections can you make to reasoning and solving one variable equations and inequalities? • What are the similarities and differences between the terms equations and inequalities?

Domain: **Expressions and Equations**	Strand: **Represent and analyze qualitative relationships between dependent and independent variables**
Suggested Student Discourse Questions	
• How would you describe the relationship between dependent and independent variables? How might a situation change if the variables were switched? • What approaches or strategies could you use to determine which variable is independent and which variable is dependent?	• How can you relate representing and analyzing qualitative relationships between independent and dependent variables to your real life? • What is your definition of qualitative relationships?

ASSESSMENT GUIDE

- Apply and extend previous understandings of arithmetic to algebraic expressions
- Reason about and solve one-variable equations and inequalities
- Represent and analyze quantitative relationships between dependent and independent variables

Grade	*CCSS Domain*	*CCSS Strand*
6	Expressions and Equations	Reason about and solve one-variable equations and inequalities

Sample Task #1 (Constructed Response)

Noomi earned $40.50 by working 4.5 hours at a store.

a. Write an equation that can be used to find how much Noomi earns per hour, *p*, at the store.

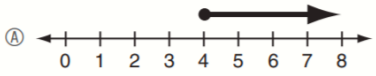
b. How much money does Noomi earn, in dollars, per hour at the store?

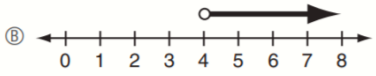
Noomi wants to earn at least $540 this month.

c. What is the **least** number of hours Noomi can work this month to meet her goal? Show your work or explain how you know.

Sample Task #2 (Multiple Choice)

Ms. Kelsey is planning to start a math club at her school. To start the club, at least 4 students must join. Which number line represents the number of students who could join Ms. Kelsey's math club?

Ⓐ 

Ⓑ 

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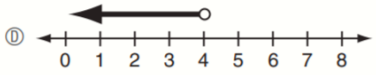
Ⓓ 

Grade	CCSS Domain	CCSS Strand
6	Expressions and Equations	Apply and extend previous understanding of arithmetic to algebraic expressions

Sample Task #1 (Constructed Response)

Brandon simplified this expression.

Expression: $4y+7\times3+4(3y+5)$

Step 1: $4y+7\times3+4(8y)$

Step 2: $4y+21+32y$

Step 3: $36y+21$

Step 4: $3(12y+7)$

Brandon made a mistake. What is his mistake?

Ⓐ In Step 1, he added the terms in the parentheses.

Ⓑ In Step 2, he did not follow the order of operations.

Ⓒ In Step 3, he did not combine like terms.

Ⓓ In Step 4, he factored incorrectly.

Sample Task #2 (Multiple Choice)

Which expressions are equivalent to $12x+8x+6$? Select the **three** equivalent expressions.

Ⓐ $4(5x)+6$

Ⓑ $18x+8x$

Ⓒ $20x+6$

Ⓓ $8x(4+6)$

Ⓔ $2(10x)+6$

Grade	*CCSS Domain*	*CCSS Strand*
6	Expressions and Equations	Represent and analyze quantitative relationships between dependent and independent variables

Sample Task #1 (Constructed Response)

A scientist measures the amount of water collected in a tub at different times during the day. This table shows the time the water had been running and the amount of water in the tub.

Time (minutes)	Amount of Water (liters)
12	18
16	24
20	30

a. Based on the information in the table, write an equation that can be used to find t, the number of minutes it took to collect w liters of water in the tub.

b. How many liters will be in the tub after 32 minutes?

Sample Task #2 (Multiple Choice)

The weight of the gasoline in a container is described by the equation $W = 6a$, where a is the number of gallons and W is the weight in pounds. Which table shows this relationship?

Ⓐ

a	W
0	6
1	7
2	8
3	9
4	10

Ⓑ

a	W
0	6
1	12
2	18
3	24
4	30

Ⓒ

a	W
0	0
1	6
2	12
3	24
4	48

Ⓓ

a	W
0	0
1	6
2	12
3	18
4	24

MLSS AND CLR GUIDE

- Apply and extend previous understandings of arithmetic to algebraic expressions
- Reason about and solve one-variable equations and inequalities
- Represent and analyze quantitative relationships between dependent and independent variables

CCSS Domain	*CCSS Cluster*
Expressions and Equations	Apply and extend previous understandings of arithmetic to algebraic expressions

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on writing, reading, evaluating algebraic expressions and identifying/generating equivalent expressions, 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, learn about the habits and experiences that your students have at home or other settings away from school. Create or modify tasks to reflect situations or topics that will be interesting or familiar to your students and their concept of the world around them.	
Cross-Curricular Connections	**Science:** • Students can work to create, read, and evaluate expressions that result from the forces at work. Students will have to be able to create and support their argument. (MS-PS2-1, Motion and Stability: Forces and Interactions) • https://www.nextgenscience.org/pe/ms-ps2-1-motion-and-stability-forces-and-interactions **English:** • RST.6.8.3- following precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. • RST.6.8.4- demonstrating the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grade 6-8 texts and topics. • RST.6.8.7- distinguish among facts, reasoned judgment based on research findings, and speculations in a text. • SL.6.1- engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners on grade 6 topics, texts, and issues building on other's ideas and expressing their own clearly.	
Validate/Affirm/Build/Bridge	• *How can you design your mathematics classroom to intentionally and purposefully legitimize the home culture and languages of students*	• 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

	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?*	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 41 7 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 writing, reading, evaluating algebraic expressions and identifying/generating equivalent expressions the use of mathematical representations within the classroom is critical because it allows students to use various strategies or representations that are familiar or logical to them, in order to make sense of verbal expressions and algebraic expressions. Many students need the support of physical or visual representations to connect their understanding of mathematical concepts and language that are new and foreign to them. This cluster introduces students to what will be the critical foundation to their conceptual understanding of algebraic concepts and patterns/relationships applied within the properties of operations, so it is important to allow students time and opportunities to connect these concepts to various mathematical representations.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	***Current Learning***	***Future Learning***
● Students will connect their prior knowledge on using whole-number exponents to denote the powers of 10 in order to properly set-up exponents and identify the base. Additionally, in 5th grade learners have already been taught the commutative and associative property of	● Students will connect what they were previously taught in 6th grade finding the greatest common factor of two whole numbers and using the distributive property to express sums of whole numbers to this cluster. These skills will be needed when students create and identify	● In 7th grade, learners will learn to apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. Learners will develop an understanding of operations with rational numbers when working with expressions and

both addition and multiplication.	equivalent expressions.	linear equations. In 8th grade, students will know and apply the properties of integer exponents to generate equivalent numerical expressions. In high school, students will need to interpret parts of an expression, such as terms, factors, and coefficients.

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 rehearses new mathematical language when studying writing, reading, evaluating algebraic expressions and identifying/generating equivalent expressions because this cluster requires the acquisition of a considerable amount of new vocabulary. The terms that are used to identify the parts and types of expressions will support students in becoming proficient in explaining and discussing many new concepts encompassed in expressions, equations, and inequalities. This is the first formal experience students have with variables, coefficients, and constants. Students will also be extending previous learning of exponents, order of operations, sums, differences products, quotients, equivalent, like and unlike terms.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	5.NBT.B.7:This standard provides a foundation for work with writing, reading, evaluating algebraic expressions and identifying/generating equivalent expressions because it ensures that students have a mastery of all operations with whole numbers and decimals. In addition, this standard focuses on the properties of operations and the relationship between addition and subtraction. If students understand that relationship, they can then make the connection to the relationship between multiplication and division. For students to

		successfully evaluate algebraic expressions and generate equivalent expressions, they need to have a mastery of all parts of this standard to use as an anchor for new learning. 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***
• The concept of exponents and exponential notation. (e.g.4^2 = 4 x 4 o r d^3 = d x d x d) • Variables represent unknown quantities. • The distributive, commutative, associative, and identity properties and that these apply to expressions also. • Two expressions can be shown to be equivalent through substitution. • A variable represents a number or a specified set of numbers. • The solution to an equation is the value that makes the equation true. • Solutions to inequalities represent a range of possible values rather than a single	• Evaluate numerical expressions that include exponents using the order of operations. • Translate between numerical and verbal expressions. • Use information from real world examples to evaluate expressions with variables. • Combine like terms • Use reasoning to find the value or values that make an equation or inequality true and select from a given set of values. • Use substitution to simplify numerical expressions. • Graph solutions of inequalities on a numberline. • Model real world situations with equations and inequalities. • Determine independent and	• Build on students' experience with the following skills: o Understand whole-number exponents to denote the powers of 10 in order. o Understand the commutative and associative property for both addition and multiplication. o Understand equal sign is and that it shows equivalence. o Understand equivalence o Understand visual fraction models o Understand the basic properties of operations o Generate patterns from rules that are given. o Understand what a dependent and independent means. o Analyze the relationship between the dependent and independent variables • Cognitive Strategies o Repeatedly model the strategies o Monitor the students' use of the strategies o Provide feedback to students o Teach self-questioning and self-monitoring strategies o Introduce multiple means of representation for mathematical ideas • Encourage students to use alternative tools to better access the grade level content. Examples include:

solution. ● The difference between >, ≥, and <, ≤ and graphing with the appropriate open or closed circle ● A change in the independent variable creates a change in the dependent variable. (e.g. as x increases y increases)	dependent variables and write an equation that represents the relationship of both. ● Represent two quantities that change in relationship with one another in real-world situations. ● Identify relationships between variables using tables, graphs, and equations.	○ Graphic organizer with grade appropriate math symbols ○ Colored pencils ○ Algebra tiles ○ Graphic Organizer with Dependent and Independent variables ○ Graphic Organizer (Rule of Four- Table, Equation, Verbal, Graph)
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 writing, reading, evaluating algebraic expressions and identifying/generating equivalent expressions by examining tasks from a different perspective through a short mini-lesson because students often need to see multiple representations or approaches to interpreting and generating algebraic expressions. The conceptual way of thinking about mathematics is new to them, and many of them need opportunities to engage with their peers who may offer a different perspective or approach to understanding.
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 on writing, reading, evaluating algebraic expressions and identifying/generating equivalent expressions by addressing conceptual understanding because some students will need explicit instruction, in order to make connections between their prior knowledge and experiences working with numerical expressions and the conceptual way of understanding algebraic expressions

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?	For example, some learners may benefit from an extension such as the opportunity to explore links between various topics when studying writing, reading, evaluating algebraic expressions because students can extend their learning of evaluating algebraic expressions by applying it to Geometry topics. They should be given tasks and opportunities to apply the concept of evaluating using geometric formulas. They can make the connection between the variables represented in the formulas for Volume, Area, and Surface Area with the conceptual way of calculating them without the use of concrete objects

CCSS Domain	*CCSS Cluster*
Expressions and Equations	Reason about and solve one-variable equations and inequalities

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on reasoning about and solving one-variable equations and inequalities, 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, learn about the habits and experiences that your students have at home or other settings away from school. Create or modify tasks to reflect situations or topics that will be interesting or familiar to your students and their concept of the world around them.	
Cross-Curricular Connections	**Science:** • https://www.nextgenscience.org/pe/ms-ess2-2-earths-systems https://www.nextgenscience.org/pe/ms-ess1-4-earths-place-universe Students can apply their study of geosciences to math by creating expressions and variables to represent the changes that have occurred on Earth. As the Earth has changed, the rate at which it changed as well as the changes to the environment can be modeled with mathematics. This can be used to study the time, space, energy phenomena that may be too small or large to observe. Students can use their expressions to conduct experiments or analysis of the above phenomena. (MS ESS2-2, Earth's Systems, MS-ESS1-4, Earth's Place in the Universe) **English:** ● RST.6.8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. ● RST.6.8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics. ● RST.6.8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). ● SL.6.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.	
Validate/Affirm/Build/Bridge	● *How can you design your mathematics classroom to intentionally and*	● Building Procedural Fluency from Conceptual Understanding: Instruction should build from conceptual understanding to allow students

	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?*	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 other methods of solving tasks that occur outside of school mathematics. For example, when studying reasoning about and solving one-variable equations and inequalities the types of mathematical tasks are critical because as students are introduced to new algebraic concepts using variables, they will need to think of ways to use strategies to connect to their prior knowledge of operations and number sense. Since students are beginning to transition from a literal understanding of numbers to a conceptual one, giving them opportunities to make connections and build meaning with the use of variables conceptually first will serve to strengthen their subsequent mastery of the procedural fluency that will be critical to their success in future experiences with algebraic topics. Deepening students' conceptual understanding will also aid in their ability to fluently apply equations and inequalities in a variety of real-world contexts.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	***Current Learning***	***Future Learning***
● Students connect their previous understandings of what the equal sign is and that it shows equivalence to this cluster. The idea of equivalence is most aligned to their work in grades 4 and 5 with visual fraction models and understanding basic properties of operations to solve	● This cluster really expands on the previous cluster of 6.EE.A.2 where students learned how to read, write and evaluate expressions in which letters stand for numbers.	● In Grade 7, students begin to formally apply the properties of operations. They will solve two step equations in the form of $px + q = r$ and $p(x + q) = r$. In Grade 8, students solve linear equations in one variable that include one solution, no solution, or infinitely many solutions. They include equations that require the distributive property or combining like terms. In Grade 8, the

		variable can be on both sides of the equation. In high school, students further their knowledge of solving equations with multistep equations that require the distributive property or combining like terms

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 (e.g. keeping equations balanced when solving, displaying solutions to equations and inequalities on a number line) when studying reasoning about and solving one-variable equations and inequalities because students have experience solving one step numerical equations, but this is the first time they will be introduced to the concept of solving equations and inequalities using inverse operations. This is also the first introduction to solving inequalities that have a solution set containing infinitely many solutions. Although students have used number lines in the past, this will be their first experience with displaying solutions and solution sets on a number line. When reading a number line, students will need to be pre-taught how to read and interpret the circles and arrows
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	*6.EE.A2: This standard provides a foundation for working with reasoning about and solving one-variable equations and inequalities because students need to have a firm grasp of how to read, interpret, write, and evaluate algebraic expressions containing variables before they will be able to clearly understand the connection between the parts of an equation or inequality. Students won't understand that an equation is two equivalent expressions if they don't have a clear understanding of expressions. In order for students to be able to interpret, explain, and discuss algebraic expressions, equations, and inequalities, they need to have a proficient understanding of the parts of expressions and different types of*

		expressions (e.g. sum, difference, product, quotient, or a combination). 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***

• A variable represents a number or a specified set of numbers.
• The solution to an equation is the value that makes the equation true.
• Solutions to inequalities represent a range of possible values rather than a single solution.
• The difference between >, ≥, and <, ≤ and graphing with the appropriate open or closed circle.
	• Use reasoning to find the value or values that make an equation or inequality true and select from a given set of values.
	• Use substitution to simplify numerical expressions.
	• Graph solutions of inequalities on a numberline.
	• Model real world situations with equations and inequalities.
		• Build on students' experience with the following skills:
		  ○ Understand equal sign is and that it shows equivalence.
		  ○ Understand equivalence
		  ○ Understand visual fraction models
		  ○ Understand the basic properties of operations
		• 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:
		  ○ Graphic Organization with inequality symbols

Re-Teach		
Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help	For example, students may benefit from re-engaging with content during a unit on reasoning about and solving one-variable equations and inequalities by clarifying

	identify content needing to be revisited during a unit?	mathematical ideas and/or concepts through a short mini-lesson because the algebraic concepts that are introduced in this cluster are a necessary foundation for students' success in all subsequent math courses. When examining the coherence map, this cluster has a direct correlation to major clusters in Math 7, Math 8, Algebra I, Geometry, and Algebra II. Taking the time to revisit, reteach, or practice the 6.EE.B cluster, will support students in becoming proficient in foundational concepts and skills that will improve their chances of success as mathematical thinkers and 9 problem solvers
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: reasoning about and solving one-variable equations and inequalities by confronting student misconceptions because if students have a misconception about the correct way to solve, check or represent a one-step equation or inequality, that will cause them more confusion when they are introduced to more complex equations and inequalities in the future. If they have a misconception about when to apply a particular operation or in what order to write the parts of an equation or inequality from a word problem, addressing and reteaching that can help students master this major cluster and its concepts to a higher degree. Students can be guided through scaffolding or collaborative discussions to examine a multitude of similar problems, in order to reflect, analyze errors, and create generalizations that will correct their misconceptions.

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?	Students are NOT learning how to solve one step equations using the properties of operations yet. To make it more difficult for students, add in fractions and decimals. The cluster is truly about reasoning. Students need to understand how to maintain equivalence when working with equations. They may use the properties of operations to solve but are not explicitly being told that is what they are doing.

CCSS Domain	*CCSS Cluster*
Expressions and Equations	Represent and analyze quantitative relationships between dependent and independent variables

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on representing and analyzing quantitative relationships between dependent and independent 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, the cost of making one Navajo ceremonial basket is $150. Students create an equation, a table of values and graphical representations of the situation. From the context, equation, or graph, students determine which variable is in a dependent relationship and independent relationship.	
Cross-Curricular Connections	**Science:** ● Students can create expressions to anticipate the real-world events that happen. Students must understand that events that occur at one scale, may not occur at a larger/smaller scale. Students will be able to create expressions about the scale of cells and molecules as well as create a visual representation of the phenomena that occur within these smaller structures. They will analyze the independent and dependent variables in these situations. ● https://www.nextgenscience.org/pe/ms-ls1-1-moleculesorganisms-structures-and-processes **English:** ● RST.6.8.3- following precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. ● RST.6.8.4- demonstrating the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grade 6-8 texts and topics. ● RST.6.8.7- distinguish among facts, reasoned judgment based on research findings, and speculations in a text. ● SL.6.1- engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners on grade 6 topics, texts, and issues building on other's ideas and expressing their own clearly	
Validate/Affirm/Build/Bridge	● *How can you design your mathematics classroom to intentionally and purposefully legitimize the home culture and*	● 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

	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?*	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 how to represent and analyze quantitative relationships between dependent and independent variables the use of mathematical representations within the classroom is critical because students can use many forms to represent relationships between quantities. Multiple representations include describing the relationship using language, a table, an equation, or a graph. Translating between multiple representations helps students understand that each form represents the same relationship and provides a different perspective.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
● In Grade 5, learners are taught how to generate patterns from rules that are given to them. This will connect when students are analyzing the relationship between the dependent and independent variables in this cluster.	● The students will expand their knowledge of 6.EE.7 in this cluster by continuing practice of writing equations in real world situations. The students will expand their knowledge of 6.RP.3 by continuing to find relationships with numbers through rate reasoning.	● The students will continue using dependent and independent variables and noticing patterns throughout the rest of their mathematical career, showing up mainly in the RP clusters and as they dive in to linear and non-linear relationships. In high school, they will be using this knowledge as they construct and compare linear, quadratic, and exponential

		models. r

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 previews new contexts for tasks within the unit when studying relationships between dependent and independent variables because this standard introduces new information i.e., to understand the relationship between dependent and independent variables. The dependent variable is the variable that can be changed; one that is affected by the change in the independent variables
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	5.O.A.B.3. This standard provides a foundation for work with summarizing and analyzing relationships between dependent and independent variables because representing two quantities in a real-world problem can be generated from a pattern using given rules. Students represent quantitative relationships in different ways. 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***
• A change in the independent variable creates a change in the dependent variable. (e.g. as x increases y increases)	• Determine independent and dependent variables and write an equation that represents the relationship of both. • Represent two quantities that change in	• Build on students' experience with the following skills: ○ Generate patterns from rules that are given. ○ Understand what a dependent and independent means. ○ Analyze the relationship between the dependent and independent variables. • Cognitive Strategies ○ Repeatedly model the strategies

	relationship with one another in real-world situations. ● Identify relationships between variables using tables, graphs, and equations.	○ 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: ○ Graphic Organizer with Dependent and Independent variables ○ Graphic Organizer (Rule of Four- Table, Equation, Verbal, Graph)

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 relationships of dependent and independent variables by critiquing student approaches/solutions to make connections through a short mini lesson because it allows students to receive immediate feedback of their work. It may even make sense for a student's critique of their peer's work to be part of making connections. It is important that it doesn't simply focus on the right or wrong solutions but presents a balanced view that allows improvement and redirection of students' learning.
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 on summarizing and analyzing dependent and independent variables by offering opportunities to understand and explore different strategies because quantitative relationships can be presented in different forms. Students mastery of identifying the dependent variable and the independent variable from real-world problems leads to a deeper understanding of the connections between the equation to a graph, table or written description that show the same relationship

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?	For example, some learners may benefit from an extension such as open-ended tasks linking multiple disciplines when studying relationships between the dependent and independent variables because providing multiple situations for the student to analyze and determine what unknown is dependent on the other components allows students' thinking and creativity to happen. One example is the use of technology, including computer apps and other hand-held technology that allows the collection of real-time data to create tables and charts. It is important for students to realize that although real-world data often is not linear, a line sometimes can model the data.

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

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

- Solve real-world and mathematical problems involving area, surface area, and volume.
  - 6.G.A.1
  - 6.G.A.2
  - 6.G.A.3
  - 6.G.A.4

Grade	CCSS Domain	CCSS Cluster
6	GEOMETRY	Solve real-world and mathematical problems involving area, surface area, and volume.

Cluster Standard: 6.G.A.1

Standard	Standards for Mathematical Practice
Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems	• **SMP 2:** Reason abstractly and quantitatively.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This cluster builds on previous understanding of area and volume to deepen the understanding of volume and develop the concept of surface area. Students use knowledge and skills to solve real-world and mathematical problems and apply the concepts by manipulating nets, cubes, and other real-world materials	• Find the area of triangles and special quadrilaterals. • Decompose and compose shapes into right triangles, triangles and quadrilaterals. • Apply understanding of finding the area of triangles and quadrilaterals to finding the area of irregular shapes that are made up of these shapes. • Solve real world and mathematical problems by applying these techniques
DOK	**Blooms**
1-2	Understand, Apply

Grade	CCSS Domain	CCSS Cluster
6	GEOMETRY	Solve real-world and mathematical problems involving area, surface area, and volume

Cluster Standard: 6.G.A.2

Standard	Standards for Mathematical Practice
Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems	• **SMP 2:** Reason abstractly and quantitatively. • **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 builds on previous understanding of area and volume to deepen the understanding of volume and develop the concept of surface area. Students use knowledge and skills to solve real-world and mathematical problems and apply the concepts by manipulating nets, cubes, and other real-world materials	• Find volume of a rectangular prism using formula (V=lwh and V=bh) and explain how this is the same as packing with unit cubes to find volume. • Apply this to using lengths that are fractional. • Solve real-world problems for volume involving fractional lengths of rectangular prisms.
DOK	**Blooms**
1-2	Apply

Grade	CCSS Domain	CCSS Cluster
6	GEOMETRY	Solve real-world and mathematical problems involving area, surface area, and volume.

Cluster Standard: 6.G.A.3

Standard	Standards for Mathematical Practice
Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	• **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 builds on previous understanding of area and volume to deepen the understanding of volume and develop the concept of surface area. Students use knowledge and skills to solve real-world and mathematical problems and apply the concepts by manipulating nets, cubes, and other real-world materials	• Draw polygons on the coordinate plane when given coordinates for vertices. • Find the side lengths of the polygons using coordinates. • Solve real-world problems by applying the use of drawing coordinates.
DOK	**Blooms**
1-2	Apply

Grade	CCSS Domain	CCSS Cluster
6	GEOMETRY	Solve real-world and mathematical problems involving area, surface area, and volume.

Cluster Standard: 6.G.A.4

Standard	Standards for Mathematical Practice
Represent three dimensional figures using nets made up of rectangles and triangles and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real world and mathematical problems.	• **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 4**: Model with mathematics.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This cluster builds on previous understanding of area and volume to deepen the understanding of volume and develop the concept of surface area. Students use knowledge and skills to solve real-world and mathematical problems and apply the concepts by manipulating nets, cubes, and other real-world materials	• Create a net (using triangles and rectangles) to represent three-dimensional figures. • Use nets to find the surface area of three-dimensional figures. • Solve real-world problems by applying the use of nets of three-dimensional figures to find surface area.
DOK	**Blooms**
1-2	Apply

Common Misconceptions

- To find the area of shapes, students may believe that every shape has a unique formula when in reality the area can always be found by decomposing the shape into non-overlapping areas.
- Students may also believe that two triangles with the same area may look exactly alike, when it is possible to have two triangles with the same area that are not congruent triangles.
- The vocabulary term "unit cube" may be difficult for students to understand as the unit cube is 1 unit. The focus with the unit cube should be on developing students' understanding that each smaller cube represents a 4 fraction of the unit cube. In addition, once this understanding is developed, students can use these smaller parts and apply them to rectangular prisms. This application may be difficult if students are unsure about multiplying fractions.

- Students may confuse the slant height and not recognize it for the height of the triangles in the net. Being that these are nets, students may only find one area and not the area of each individual part of the net and add them together. The concept of nets may be difficult for students to understand, specifically the translation from the 3-D figure to the net and how they coincide. This may need to be reinforced as to how a pyramid and a rectangular prism coincide to their nets

Student Discourse Guide

- **Purposeful, rich classroom discourse offers students the opportunity to express their ideas, thinking, and to critique the reasoning of others in a variety of ways (writing, drawing, verbal). Purposeful implementation of 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 paths to solutions and reveal knowledge or misunderstandings to educators. The process also allows educators to honor students' culture, lived experiences and evolving math identities.**
- **Discourse that focuses on tasks that promote reasoning and problem solving is a primary mechanism for developing conceptual understanding and meaningful learning of mathematics (Michaels, O'Connor, and Resnick, 2008)**

Domain: **Geometry**	Strand: **Solve real-world and mathematical problems involving area, surface area, and volume.**

Suggested Student Discourse Questions

- How do you compare surface area and volume?
- Make a comparison with your approach or strategy used to that of another student involving a problem related to volume?
- Do you need the same amount of paper to wrap a box as you do to stuff a box? What are other real world examples or area and volume?
- In your own words, what is the difference between area and surface area?

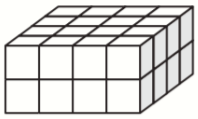
ASSESSMENT GUIDE

- Solve real-world and mathematical problems involving area, surface area, and volume

Grade	*CCSS Domain*	*CCSS Strand*
6	GEOMETRY	Solve real-world and mathematical problems involving area, surface area, and volume.

Sample Task #1 (Constructed Response)

Jason used cubes to make this rectangular prism.

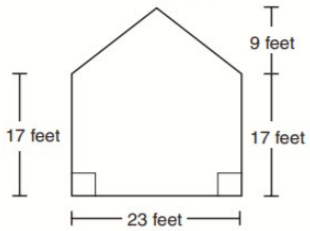


Each cube has an edge length of $\frac{1}{2}$ inch.

What is the volume, in cubic inches, of the rectangular prism?

Sample Task #2 (Multiple Choice)

Rochelle draws this diagram to represent a section of a school playground.



What is the area, to the nearest square foot, of the section of the playground?

Ⓐ 299
Ⓑ 391
Ⓒ 495
Ⓓ 598

MLSS AND CLR GUIDE

- Solve real-world and mathematical problems involving area, surface area, and volume

CCSS Domain	*CCSS Cluster*
Geometry	Solve real-world and mathematical problems involving area, surface area, and volume

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on solving real-world and mathematical problems involving area, surface area, and volume , consider options for learning from your families and communities the cultural and linguistic ways this mathematics exists outside of school to create stronger home to school connections for students, for example, learning about the mathematics used within the different careers of your family and community can provide a strong connections between school and careers. For example, how geometry of area, surface area and volume is used in one of New Mexico's economy in the oil field.	
Cross-Curricular Connections	Science & English: ● RST.6.8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. RST.6.8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics. ● RST.6.8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). ● SL.6.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.	
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*	● Eliciting and Using Evidence of Student Thinking: Eliciting and using student thinking can promote a classroom culture in which mistakes or errors are viewed as opportunities for learning. When student thinking is at the center of classroom activity, "it is more likely that students who have felt evaluated or judged in their past mathematical experiences will make meaningful contributions to the classroom over time." For example, when studying 6th grade geometry of solving real-world and mathematical problems involving area, surface area, and volume

	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?*	eliciting and using student thinking is critical because student thinking supports peer learning from different views and validating student thinking creates culture for students who contribute.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
• Learners build on their knowledge of area from Grade 3 where they count the area of a rectangle and connect it to their understanding of multiplication in Grade 4. Learners understand how to find the volume of right rectangular prisms with whole numbers in Grade 5. Apply the area and perimeter formulas for rectangles in real world and mathematical problems. **(4.MD.3)**	• Learners are flexible using the terms base and length when solving for the area of a two or three-dimensional shape. Develop the concept of surface area. Learners understand how to find the volume of right rectangular prisms using fractions in the length of the edges. • Connects to lessons on negative integers **(6.NS.8)** and graphing points in all quadrants. **(6.RP.3.a)** • Find distance on the coordinate plane by counting the units on the coordinate plane (no formula). Create polygons in quadrants I, II, III, and IV so learners can apply their knowledge of absolute value.	• In Grade 7, learners will continue to draw, construct, and describe geometrical figures and discover relationships between them (without nets). Calculate and compare the volume of cones, cylinders, and spheres. **(8.G.C.9)** Prepare for grade 8 work with transformations by working with polygons in coordinate plane. • Learners will further their knowledge on distance in 8th grade when they start to find the lengths of diagonal lines. • Learners will use their knowledge of the Pythagorean Theorem to find distance on the coordinate plane and later use the distance

	(6.NS.7)	formula. In high school, learners will apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). In high school, learners will give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. In high school, students will use the idea of nets to identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.

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 rehearses prior learning when studying 6.G.A because the 6th grade standard builds upon 5.MD.C.3 & 5.MD.C.5 where they went from building arrays to using arrays to find area and volume. 6.G.A utilizes their previous understanding on shape composition and decomposition to understand and develop the formulas necessary for area, surface area and volume
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	5.MD.C.3, 5.MD.C.5 This standard provides a foundation for work with **6.G.A** because they move from building to applying the concept of which the 6th grade standard then extends. 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 6.G.A by providing specific feedback to students on their work through a short mini 6 lesson because this can clear any misconceptions of incorrect formula usage and concept misunderstandings.
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 6.G.A by confronting student misconceptions because students need to understand which formula is used during which time and that area is 2D volume is 3D. Therefore, it is important to make sure students have a solid foundational understanding of the vocabulary, formulas and concepts associated with this standard.
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?		For example, some learners may benefit from an extension such as the application of and development of abstract thinking skills when studying to solve real-world and mathematical problems involving area, surface area, and volume because it is a skill that students need to improve upon. Making connections and generalizations between the area, surface area and volume of an object can help them deepen their understanding of the measurements and the formulas.

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Standards Breakdown

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
  - 6.NS.A.1
- Compute fluently with multi-digit numbers and find common factors and multiples.
  - 6.NS.B.2
  - 6.NS.B.3
  - 6.NS.B.4
- Apply and extend previous understandings of numbers to the system of rational numbers.
  - 6.NS.C.5
  - 6.NS.C.6
  - 6.NS.C.7

Grade	*CCSS Domain*	*CCSS Cluster*
6	**THE NUMBER SYSTEM**	**Apply and extend previous understandings of multiplication and division to divide fractions by fractions.**

Cluster Standard: 6.NS.A.1

Standard	**Standards for Mathematical Practice**
Interpret and compute quotients of fractions and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi.?	• **SMP 2:** Reason abstractly and quantitatively. • **SMP 6:** Attend to precision. • **SMP 7:** Look for and make use of structure.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students will continue their previous understanding of the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to explain why the procedures for dividing fractions make sense. They use visual models and equations to divide whole numbers by fractions and fractions by fractions to solve word problems	• Describing, writing, or verbally explaining the relationship between multiplication and division of fractions. • Interpret and compute quotients of fractions using visual models and equations. • Create visual fraction models and equations to represent the problem. • Solve word problems involving division of fractions by fractions.
DOK	**Blooms**
1-2	Understand, Apply

Common Misconceptions

- Students may think dividing by 1/2 is the same as dividing something in half. Dividing by 1/2 means to find how many one halves there are in a quantity. Dividing in half means to take a quantity and divide it into two equal parts. Thus 6 divided by 1/2 = 12 and 6 divided in half equals 3.

From: Ruth Harbin Miles and Lois A. Williams "Your Mathematics Standards Companion, Grade 6-8: What They Mean and How to Teach" 2018 and *http://www.katm.org/flipbooks/6%20FlipBook%20Final%20CCSS%202014.pdf*

- Students may not realize how to apply the problem to a real-life situation in which they must know which quantity represents which part of the division problem.

Grade	*CCSS Domain*	*CCSS Cluster*
6	**THE NUMBER SYSTEM**	**Compute fluently with multi-digit numbers and find common factors and multiples**

Cluster Standard: 6.NS.B.2

Standard	**Standards for Mathematical Practice**
Fluently divide multi-digit numbers using the standard algorithm.	• **SMP 6:** Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students will continue to build on their previous understanding of adding, subtracting, multiplying, and dividing to fluently use algorithms to solve problems. They will also work with finding the GCF to begin the early stages of factoring.	• Fluently divide multi-digit numbers.
DOK	**Blooms**
1-2	Apply

Grade	*CCSS Domain*	*CCSS Cluster*
6	**THE NUMBER SYSTEM**	**Compute fluently with multi-digit numbers and find common factors and multiples**

Cluster Standard: 6.NS.B.3

Standard	**Standards for Mathematical Practice**
Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	• **SMP 6:** Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**

• Students will continue to build on their previous understanding of adding, subtracting, multiplying, and dividing to fluently use algorithms to solve problems. They will also work with finding the GCF to begin the early stages of factoring.	• Fluently add, subtract, multiply and divide multi-digit decimals.
DOK	**Blooms**
1-2	Apply

Grade	*CCSS Domain*	*CCSS Cluster*
6	**THE NUMBER SYSTEM**	**Compute fluently with multi-digit numbers and find common factors and multiples**

Cluster Standard: 6.NS.B.4

Standard	Standards for Mathematical Practice
Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express 36 + 8 as 4 (9 + 2)	• **SMP 6:** Attend to precision. • **SMP 7**: Look for and make use of structure.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students will continue to build on their previous understanding of adding, subtracting, multiplying, and dividing to fluently use algorithms to solve problems. They will also work with finding the GCF to begin the early stages of factoring.	• Find the GCF of two whole numbers less than or equal to 100. • Find the LCM of two whole numbers less than or equal to 12. • Use the distributive property to express a sum of two whole numbers (1-100) with a common factor as a multiple of a sum of two whole numbers with no common factor .
DOK	**Blooms**
1-2	Understand, Apply

Common Misconceptions

• Students may misplace the decimal point when representing the product or quotient of decimals. • Students may confuse the concepts of factors and multiples.	• Students may have difficulty in finding LCM and GCFs. They may misunderstand when to apply LCM and when to apply GCF to solve a problem. *From: Ruth Harbin Miles and Lois A. Williams "Your Mathematics Standards Companion, Grade 6-8: What They Mean and How to Teach" 2018 and*

	http://www.katm.org/flipbooks/6%20FlipBook%20Final%20CCSS%202014.pdf

Grade	*CCSS Domain*	*CCSS Cluster*
6	**THE NUMBER SYSTEM**	**Apply and extend previous understandings of numbers to the system of rational**

Cluster Standard: 6.NS.C.5

Standard	**Standards for Mathematical Practice**
Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively. • **SMP 4:** Model with mathematics.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students will extend the number line to represent all rational numbers and recognize that number lines may be either horizontal or vertical. Horizontal and vertical number lines help students move from number lines to coordinate grids. They will focus on the relationship between negative and positive numbers and the meaning of absolute value. This cluster will lay the foundation for working with rational numbers, algebraic expressions and equations, functions and the coordinate plane in seventh and eighth grade.	• Understand that positive and negative numbers are used to describe amounts having opposite values. • Represent quantities in real-world contexts and explain the meaning of 0 in each situation.
DOK	**Blooms**
2	Understand, Apply

Grade	*CCSS Domain*	*CCSS Cluster*
6	**THE NUMBER SYSTEM**	**Apply and extend previous understandings of numbers to the system of rational**

Cluster Standard: 6.NS.C.6

Standard	Standards for Mathematical Practice
Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. **A:** Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., -(-3) = 3, and that 0 is its own opposite **B:** Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. **C:** Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	• **SMP 4**: Model with mathematics. • **SMP 6:** Attend to precision. • **SMP 8:** Look for and express regularity in repeated reasoning.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
Students will extend the number line to represent all rational numbers and recognize that number lines may be either horizontal or vertical. Horizontal and vertical number lines help students move from number lines to coordinate grids. They will focus on the relationship between negative and positive numbers and the meaning of absolute value. This cluster will lay the foundation for working with rational numbers, algebraic expressions and	• Explain the concept of rational numbers by understanding that a rational number is a point on a number line and extending number line diagrams to show positive and negative numbers on the line and in the coordinate plane. • Express orally and in writing that opposite signs of a number indicate opposite places on a number line.

equations, functions and the coordinate plane in seventh and eighth grade.	• Understand where positive and negative numbers in an ordered pair appear on a coordinate plane and identify quadrants.
DOK	**Blooms**
2	Understand

Grade	*CCSS Domain*	*CCSS Cluster*
6	**THE NUMBER SYSTEM**	**Understand ordering and absolute value of rational numbers**

Cluster Standard: 6.NS.C.7

Standard	Standards for Mathematical Practice
Understand ordering and absolute value of rational numbers **A:** Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line oriented from left to right **B:** Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write - 3°C > -7°C to express the fact that -3°C is warmer than -7°C **C:** Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real world situation. For example, for an account balance of -30 dollars, write |-30| = 30 to describe the size of the debt in dollars. **D:** Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively. • **SMP 3:** Construct viable arguments and critique the reasoning of others.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students will extend the number line to represent all rational numbers and recognize that number lines may be either horizontal or vertical. Horizontal and vertical number lines help students move from number lines to coordinate grids. They will focus on the relationship between	• Understand the absolute value of rational numbers. • Interpret and explain the meanings behind inequality statements. • Show understanding of rational numbers by giving them context in a real-life situation.

negative and positive numbers and the meaning of absolute value. This cluster will lay the foundation for working with rational numbers, algebraic expressions and equations, functions and the coordinate plane in seventh and eighth grade.	● Understand that absolute value is a number's distance from zero on a number line. ● Understand the difference between absolute value from order statements. ● Explain the reasoning that as a value of a negative rational number decreases its absolute value increases.
DOK	**Blooms**
2	Understand, Apply

Grade	*CCSS Domain*	*CCSS Cluster*
6	**THE NUMBER SYSTEM**	**Apply and extend previous understandings of numbers to the system of rational numbers.**

Cluster Standard: 6.NS.C.8

Standard	Standards for Mathematical Practice
Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively. • **SMP 4:** Model with mathematics.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students will extend the number line to represent all rational numbers and recognize that number lines may be either horizontal or vertical. Horizontal and vertical number lines help students move from number lines to coordinate grids. They will focus on the relationship between negative and positive numbers and the meaning of absolute value. This cluster will lay the foundation for working with rational numbers, algebraic expressions and equations, functions and the coordinate plane in seventh and eighth grade.	• Graph points in all four quadrants solving real-world problems. • Find distance between points using coordinates and absolute value.
DOK	**Blooms**
1-2	Understand

Common Misconceptions

• Students may confuse the idea that greater the magnitude of a negative number the greater the number.	• Students may confuse the absolute value bar with parenthesis. • Students may think that absolute value makes

• Students may confuse the placement of rational numbers on the number line. • Students may confuse the absolute value bar with the number 1.	things positive and not understand it is about distance from 0 *From: Ruth Harbin Miles and Lois A. Williams "Your Mathematics Standards Companion, Grade 6-8: What They Mean and How to Teach" 2018 and http://www.katm.org/flipbooks/6%20FlipBook%20Final%20CCSS%202014.pdf*

Student Discourse Guide

- **Purposeful, rich classroom discourse offers students the opportunity to express their ideas, thinking, and to critique the reasoning of others in a variety of ways (writing, drawing, verbal). Purposeful implementation of 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 paths to solutions and reveal knowledge or misunderstandings to educators. The process also allows educators to honor students' culture, lived experiences and evolving math identities.**
- **Discourse that focuses on tasks that promote reasoning and problem solving is a primary mechanism for developing conceptual understanding and meaningful learning of mathematics (Michaels, O'Connor, and Resnick, 2008)**

Domain: **The Number System**	Strand: **Apply and extend previous understanding of multiplication and division to divide fractions by fractions**

Suggested Student Discourse Questions

- Is there more than one appropriate strategy to solve the problem and which one will you choose?
- How does your strategy differentiate from another student's approach to the problem?
- What are the advantages and disadvantages of using a fraction bar to represent division?
- Where in your personal life do you normally see the use of multiplication and division of fractions?
- Explain why the denominator changes as you multiply and divide fractions. What does the new denominator mean in terms of the solution?

Domain: **The Number System**	Strand: **Compute fluently with multi-digit numbers and find common factors and multiples**
Suggested Student Discourse Questions	
• Do you feel your strategy was the best one chosen or could you have done better solving the problem with another strategy? Explain. • What are the different approaches you might consider when solving this problem?	• Create a word problem of using common factors to solve problems of dividing, such as the same number of candies and cookies evenly in each group. • What is a common factor and how do we calculate a common factor?

Domain: **The Number System**	Strand: **Apply and extend previous understandings of numbers to the system of rational numbers**
Suggested Student Discourse Questions	
• What are the similarities and differences between the positive and negative rational numbers? • Did the strategy you use adequately help you to determine a solution for the problem?	• How are positive and negative numbers applied, such as weather forecasting, banking, and sports? • What are different terms that are used to describe positive and negative numbers?

ASSESSMENT GUIDE

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions
- Compute fluently with multi-digit numbers and find common factors and multiples
- Apply and extend previous understandings of numbers to the system of rational numbers

Grade	*CCSS Domain*	*CCSS Strand*
6	The Number System	Apply and extend previous understanding of multiplication and division to divide fractions by fractions

Sample Task #1 (Constructed Response)

Consider the expression 2^3.

a. Write an equivalent expression without exponents. Calculate the value of this expression.

The expression 2^3 is multiplied by 16, resulting in a new expression, 2^x.

b. What is the value of x in this new expression? Show your work or explain how you know.

Sample Task #2 (Multiple Choice)

Which expressions have a value less than 1? Select the **three** correct expressions.

Ⓐ 8.2×0.06

Ⓑ 1.8×0.75

Ⓒ $28.3 \div 36.7$

Ⓓ $0.48 \div 0.12$

Ⓔ $3.8 - 3.576 + 0.2$

Ⓕ $2.27 + 3.68 - 4.625$

Grade	*CCSS Domain*	*CCSS Strand*

6	The Number System	Compute fluently with multi-digit numbers and find common factors and multiples

Sample Task #1 (Constructed Response)

A company manufactures kitchen equipment.

- The company redesigns its coffee maker every 6 years.
- The company redesigns its microwave every 4 years.
- Both the coffee maker and the microwave were redesigned this year.

a. How many years will it be before both the coffee maker and the microwave are redesigned in the same year again? Show your work or explain how you know.

The manufacturer is shipping coffee makers to stores.

- Each coffee maker is the same weight.
- Different shipments contain different numbers of coffee makers.

The weights of three shipments of coffee makers are:

- 56 pounds
- 70 pounds
- 49 pounds

b. What is the amount, in pounds, one coffee maker could weigh? Show your work or explain how you know.

Sample Task #2 (Multiple Choice)

Ling records the temperature four different times in one day.

- At 5:00 a.m., the temperature was 3°C.
- At 8:00 a.m., the temperature was −5°C.
- At 11:00 a.m., the temperature was −3°C.
- At 2:00 p.m., the temperature was 2°C.

Which statements about the temperatures are true? Select the **three** correct answers.

Ⓐ $-3°C < -5°C$

Ⓑ $3°C > -3°C$

Ⓒ $2°C < -5°C$

Ⓓ The temperature gets warmer between 5:00 a.m. and 8:00 a.m.

Ⓔ The temperature gets warmer between 8:00 a.m. and 11:00 a.m.

Ⓕ The temperature gets warmer between 11:00 a.m. and 2:00 p.m.

Grade	*CCSS Domain*	*CCSS Strand*
6	**The Number System**	**Apply and extend previous understandings of numbers to the system of rational numbers**

Sample Task #1 (Constructed Response)

1. Points *A*, *B*, *C*, and *D* create a rectangle.
   - Point *A* is located at $(-5, -5)$.
   - Point *B* is located at $(-5, 7)$.

   a. What is the length, in units, of side *AB*? Show your work or explain how you know.
   - Point *C* is a reflection of point *B* across the *y*-axis.
   - Point *D* is a reflection of point *A* across the *y*-axis.

   b. What is the perimeter (the distance around the rectangle), in units, of rectangle *ABCD*? Show your work or explain how you know.

Sample Task #2 (Multiple Choice)

. Which numerical expression represents the phrase "the product of 8 and z, increased by 2"?

Ⓐ $2(8z)$

Ⓑ $8z+2$

Ⓒ $2(8+z)$

Ⓓ $8+z+2$

MLSS AND CLR GUIDE

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions
- Compute fluently with multi-digit numbers and find common factors and multiples
- Apply and extend previous understandings of numbers to the system of rational numbers

CCSS Domain	*CCSS Cluster*
The Number System	**Apply and extend previous understandings of multiplication and division to divide fractions by fractions**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on the application and extension of previous understandings of multiplication and division to divide fractions by fractions, 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 ways division of fractions is used in the home and community (cooking, sharing, distance problems) can be a great way to connect school tasks with home tasks.
Cross-Curricular Connections	**English**: ● RST.6.8.3- following precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. ● RST.6.8.4- demonstrating the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grade 6-8 texts and topics. ● RST.6.8.7- distinguish among facts, reasoned judgment based on research findings, and speculations in a text. ● SL.6.1- engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners on grade 6 topics, texts, and issues building on other's ideas and expressing their own clearly. **Social Studies:** ● CCSS.ELA-LITERACY.RH.6-8.1/CCSS.ELA-LITERACY.RH.6- 8.7-Students can determine growth in different contexts related to social studies. Students can apply their knowledge of number operations to create a claim for a question ● CCSS.ELA-LITERACY.RH.6-8.7-Students can use this idea of plotting points in a coordinate plane to adjust it to the longitude and latitude lines on a map. They can use this to track a traveling pattern and discuss it further. They can track a voyage over 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?*	• Eliciting and Using Evidence of Student Thinking: Eliciting and using student thinking can promote a classroom culture in which mistakes or errors are viewed as opportunities for learning. When student thinking is at the center of classroom activity, "it is more likely that students who have felt evaluated or judged in their past mathematical experiences will make meaningful contributions to the classroom over time." For example, when studying the application and extension of previous understandings of multiplication and division to divide fractions by fractions eliciting and using student thinking is critical because as students apply and extend from previous learning it is natural for them to develop errors or make mistakes in thinking and at the same time have solid thinking that needs to be built upon. It is important to develop and create a culture within the classroom that not only allows for these mistakes but values them and finds pathways for students and teachers to affirm ideas while building correct conceptual understanding.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	***Current Learning***	***Future Learning***
• Connect student's 3 rd and 5th grade understandings of division as an unknown factor problem. A student's ability to interpret whole number by whole number quotients and whole number by fraction quotients will be applied within this cluster. (e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal	• Students will need to understand how to complete operations with rational numbers to help demonstrate their conceptual understanding of the distributive property	• Connect the understandings from this cluster to the 7.NS standards in 7th grade when students are required to demonstrate understanding of multiplication and division and of fractions to multiply and divide rational numbers. In Grade 7, learners solve real-world and mathematical problems involving the four operations with rational numbers. In HS Algebra standards, learners continue to

shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.)		use their understanding of division of fraction knowledge when solving more complex algebraic equations.

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 rehearses prior learning when studying the application and extension of previous understandings of multiplication and division to divide fractions by fractions because as students work in interpreting quotients and solving real world problems involving dividing fractions, it will help to have a solid understanding in multiplying and dividing fractions.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	This standard provides a foundation for work with the application and extension of previous understandings of multiplication and division to divide fractions by fractions because in 5th grade students extend their knowledge of multiplication and division to work with fractions. This major work prepares them to be able to solve real world problems with fractions and interpret quotients. 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***
• The meaning behind dividing fractions by fractions (e.g. by using visual models and equations). • That multiplication	• Compute division of fraction by fraction problems. • Solve real-world and mathematical problems involving division of fractions	• Build on students' experience with the following skills: ○ Understand division as an unknown factor problem. ○ Interpret whole number by whole number quotients ○ Interpret whole number by fraction

and division are inverse operations ● The meaning behind positive and negative numbers and how they are used to represent quantities. ● How opposites are located on a number line and zero is its own opposite. ● As the number line moves to the left (into the negative) the numbers continue to get smaller even though the absolute value of the number is larger. ● The meaning of absolute value as the distance from 0 on a number line.	by fractions. ● Interpret what the quotient represents in mathematical and real-world problems. ● Represent real-world contexts using positive and negative numbers. ● Find and position integers and other rational numbers on both horizontal and vertical number lines and use position and absolute value to order rational numbers. ● Interpret inequalities as comparing two numbers on a number line. ● Find distances between points with the same first or the same second coordinate using the idea of absolute value.	quotients ○ Understand the marks and units on a horizontal scale or number line. ○ Understand graphed points on a coordinate plane. ○ Interpreted what the graphed points represent. ○ ● 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: ○ Algebra tiles ○ Multiplication chart ○ Real World manipulatives, such as football field, ocean, temperature, etc ○ Coordinate Plane

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 the application and extension of previous understandings of multiplication and division to divide fractions by fractions by critiquing student approaches/solutions to make connections through a short mini-lesson because as students think through and process their own work and work of others they form a deeper understanding of the concept. This would be a good opportunity to have kids work in groups to solve problems and present solutions for discussion.

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 application and extension of previous understandings of multiplication and division to divide fractions by fractions by addressing conceptual understanding because students need to have a good foundation in both multiplication and division as well as fraction concepts to be able to apply these skills to solving real world problems and truly being able to understand what the solution means .

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?	For example, some learners may benefit from an extension such as the application of and development of abstract thinking skills when studying the application and extension of previous understandings of multiplication and division to divide fractions by fractions because students benefit from visual representations such as a model showing division of a fraction by a fraction and what the model actually represents. An activity where students can apply a visual representation with a real world problem and interpret the solution would help students make important connections.

CCSS Domain	*CCSS Cluster*
The Number System	**Compute fluently with multi-digit numbers and find common factors and multiples**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on computing fluently with multi-digit numbers and finding common factors and multiples, 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 ways decimals, factors or multiples are used in the home and community can a be a great way to connect schools tasks with home tasks.	
Cross-Curricular Connections	**English**: ● RST.6.8.3- following precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. ● RST.6.8.4- demonstrating the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grade 6-8 texts and topics. ● RST.6.8.7- distinguish among facts, reasoned judgment based on research findings, and speculations in a text. ● SL.6.1- engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners on grade 6 topics, texts, and issues building on other's ideas and expressing their own clearly. **Social Studies**: ● CCSS.ELA-LITERACY.RH.6-8.1/CCSS.ELA-LITERACY.RH.6- 8.7-Students can determine growth in different contexts	
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 computing fluently with multi-digit numbers and finding common factors and multiples the types of mathematical tasks are critical because all students need a well-developed conceptual understanding of operations with decimals, factors

	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?	and multiples. It is important to make sure that opportunities are given to develop this understanding so that some students are not at a disadvantage when using the algorithm and developing fluency.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
• Students will need to reflect on their previous understanding of factor pairs from 4th grade. They will connect their previous learning around multiples to finding LCMs and GCFs in this cluster. • This cluster also connects to instruction from Grade 5 where students found whole number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value. These same skills will be utilized when dividing decimals	• In this cluster students use the distributive property to express a sum of whole numbers. This connects to future 6th grade learning when they explore the conceptual understanding of the distributive property in the 6.EE.A cluster.	• Students will connect their skills with the standard algorithm in order to successfully multiply and divide rational numbers. This will be connected in the standard algorithm as well as in application to real-world contexts. In high school, learners continue to use the distributive property to express a sum of two whole numbers with a common factor as a multiple of a sum of two whole numbers with no common factor as they learn factorization.

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 rehearses prior learning when studying

	productively struggle with the mathematics for this cluster within your HQIM?	computing fluently with multi-digit numbers and finding common factors and multiples because students were asked in 5th grade to perform operations with multi-digit whole numbers and decimals to hundredths and in 4th grade to gain familiarity with factors and multiples. The basic work of both grades will be vital to developing fluency.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	4.OA.B.4: This standard provides a foundation for working with computing fluently with multi-digit numbers and finding common factors and multiples because students are asked to determine factors and if a number is composite or prime. This will help them in their grade level work of expressing factors in different ways using the distributive property. 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 computing fluently with multi-digit numbers and finding common factors and multiples by clarifying mathematical ideas and/or concepts through a short mini lesson because students may confuse operations with decimals and need a reminder of how to work within the algorithm and/or look at different models for factors to determine if they could both be correct.
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 on computing fluently with multi-digit numbers and finding common factors and multiples by addressing conceptual understanding because it is important for students to understand why an algorithm works if they are going to use it with fluency. This helps students to catch mistakes and understand if a solution is reasonable or not
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?	For example, some learners may benefit from an extension such as the opportunity to understand concepts more quickly and explore them in greater depth than other students when studying computing fluently with multi-digit numbers and finding common factors and multiples because problem solving and modeling using a variety of interesting topics can be used to give students experience in applying the skills they are now fluent with.

CCSS Domain	*CCSS Cluster*
The Number System	**Apply and extend previous understandings of numbers to the system of rational numbers**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on applying and extending previous understandings of numbers to the system of rational numbers, 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 representations of positive numbers, negative numbers, and the meaning of zero across the languages in the classroom brings about a wide array of conceptual understanding that can be referenced in diverse cultures.	
Cross-Curricular Connections	**English:** ● RST.6.8.3- following precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. ● RST.6.8.4- demonstrating the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grade 6-8 texts and topics. ● RST.6.8.7- distinguish among facts, reasoned judgment based on research findings, and speculations in a text. ● SL.6.1- engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners on grade 6 topics, texts, and issues building on other's ideas and expressing their own clearly. **Social Studies**: ● CCSS.ELA-LITERACY.RH.6-8.7-Students can use this idea of plotting points in a coordinate plane to adjust it to the longitude and latitude lines on a map. They can use this to track a traveling pattern and discuss it further. They can track a voyage over 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?*	● Task: When planning with your HQIM, consider how to modify tasks to represent the prior experiences, culture, language and interests of your students to "portray mathematics as useful and important in students' lives and promote students' lived experiences as important in mathematics class." Tasks can also be designed to "promote social justice [to] engage students in using mathematics to understand and eradicate social inequities (Gutstein 2006)." For example, when studying how to apply and extend previous understandings of numbers to the system of rational numbers the types of

	• *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?*	mathematical tasks are critical because it allows students to work on their specific interests and strengths. For example, differentiated tasks can be Banking and Finance (deposits and withdrawals), Is it hot or cold? (temperatures), The Extra Mile (moving forward or backward), etc. Assigning different tasks is important and crucial because it is directly linked to students' learning. Also, the level of task complexity can vary by creating or adapting materials to the students' level of thinking and understanding. Teachers should at first know and understand the uniqueness of every student and plan accordingly.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
• This cluster is connected to what students previously learned in third grade, when they marked off units on a horizontal scale or number line. Students will recall that a fraction can be represented on a number line, in the space between whole numbers. They will also recall the skills from Grade 5 when they graphed points on a coordinate plane and interpreted what the points represent	• There are connections between this cluster and the 6.EE.B cluster when learners recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams. Also, in 6.G.3, there are connections made when students use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate	• The skills from this cluster are applied in 7th grade when students make connections between their 6^{th} grade understanding of what rational numbers are to include the addition and subtraction of integers. Students will need to represent addition and subtraction of integers on a horizontal and/or vertical number line.

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 (e.g., number lines) when studying apply and extend previous understandings of numbers to the system of rational numbers because students can build understanding of positive and negative integers, reinforce concepts of distance and location on number lines
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	6.NS.C. 5 - This standard provides a foundation for work with applying and extending previous understandings of numbers to the system of rational numbers because it establishes the foundation of conceptual understanding of positive and negative numbers including zero. Ordering and comparing numbers can be easily done when visualized on a number line. 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***

• The meaning behind positive and negative numbers and how they are used to represent quantities.
• How opposites are located on a number line and zero is its own opposite.
• As the number line moves to the left (into the negative) the numbers continue to get smaller even though the absolute value of the number is larger.
	• Represent real-world contexts using positive and negative numbers.
	• Find and position integers and other rational numbers on both horizontal and vertical number lines and use position and absolute value to order rational numbers.
	• Interpret inequalities as comparing two numbers on a number line.
	• Find distances between points with the same first or the same second
		• Build on students' experience with the following skills:
		  ○ Understand the marks and units on a horizontal scale or number line.
		  ○ Understand graphed points on a coordinate plane.
		  ○ Interpreted what the graphed points represent.
		
		• 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

• The meaning of absolute value as the distance from 0 on a number line.	coordinate using the idea of absolute value.	include: ○ Real World manipulatives, such as football field, ocean, temperature, etc. ○ Coordinate Plane

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 applying and extending previous understanding of numbers to the system of rational numbers by critiquing student approaches/solutions to make connections through a short mini lesson because starting from what they know will make connections easier to approach like the concepts of losing and winning, going backward and moving forward, below freezing and above freezing. r
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 on applying and extending previous understanding of numbers to the system of rational numbers by addressing conceptual understanding because the idea of positive numbers, negative numbers and zero are abstract in nature

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?	For example, some learners may benefit from an extension such as the application of and development of abstract thinking skills when studying, applying and extending previous understanding of numbers to the system of rational numbers because students are expected to use their conceptual understanding in solving word problems.

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

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

- Develop understanding of statistical variability
  - 6.SP.A.1
  - 6.SP.A.2
  - 6.SP.A.3
- Summarize and describe distributions
  - 6.SP.B.4
  - 6.SP.B.5

Grade	*CCSS Domain*	*CCSS Cluster*
6	**STATISTICS & PROBABILITY**	**Develop understanding of statistical variability**

Cluster Standard: 6.SP.A.1

Standard	**Standards for Mathematical Practice**
Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students will develop an understanding of statistical thinking. They will learn how to write statistical questions used to survey and collect data. They will study measures of center and variability with newly learned knowledge of mean, median, mode, and range. Students will discover that different ways to measure center produce different values and that interpreting measures of center for the same data develops the understanding of how each measure can change how the data gets interpreted	• Students will understand that their question promotes an investigation. • Students will understand the difference in quantitative (numerical) data to qualitative(categorical) data. • Students will develop a question that promotes variability in the data.
DOK	**Blooms**
1-2	Remember, Understand

Grade	*CCSS Domain*	*CCSS Cluster*
6	**STATISTICS & PROBABILITY**	**Develop understanding of statistical variability**

Cluster Standard: 6.SP.A.2

Standard	**Standards for Mathematical Practice**
Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively. • **SMP 6**: Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students will develop an understanding of statistical thinking. They will learn how to write statistical questions used to survey and collect data. They will study measures of center and variability with newly learned knowledge of mean, median, mode, and range. Students will discover that different ways to measure center produce different values and that interpreting measures of center for the same data develops the understanding of how each measure can change how the data gets interpreted	• Find and understand that measures of center (mean/median) summarize a set of data with a single number. • Find and understand that measures of variation (range/MAD) describe a set of data's variability with a single number.
DOK	**Blooms**
1-2	Understand, Analyze

Grade	*CCSS Domain*	*CCSS Cluster*
6	**STATISTICS & PROBABILITY**	**Develop understanding of statistical variability**

Cluster Standard: 6.SP.A.3

Standard	Standards for Mathematical Practice
Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively. • **SMP 6**: Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students will develop an understanding of statistical thinking. They will learn how to write statistical questions used to survey and collect data. They will study measures of center and variability with newly learned knowledge of mean, median, mode, and range. Students will discover that different ways to measure center produce different values and that interpreting measures of center for the same data develops the understanding of how each measure can change how the data gets interpreted	• Find and understand that measures of center (mean/median) summarize a set of data with a single number. • Find and understand that measures of variation (range/MAD) describe a set of data's variability with a single number.
DOK	**Blooms**
1-2	Understand, Analyze

Common Misconceptions

• Students must shift their thinking from asking their question only about themselves to asking it in a larger population. Students are looking for a question that produces variability in the data. Students may try to ask a question of themselves such as "How big is my shoe size?" instead of asking the question of a larger population as a class or school (What are the shoe sizes in my	• Students may have issues with the vocabulary word symmetrical. They may have trouble describing data when it is not a traditional visual representation they have studied before (dot plot, histograms, etc.). In addition, students may mix up mean and median and what their purpose is for representing the data set. • The concept of center, spread, and shape may

class? What are the shoe sizes in my school?). In addition, students may try to ask a question that does not produce variability in the data by asking a yes or no question (do you like playing football?) or that provides categorical data (Do you like cats or dogs?). Students may assume that asking someone what zip code they live in is numerical data. This would actually be classified as categorical.	provide difficult vocabulary for students. As students begin to analyze variability, they may not understand the connection between range, spread, and variability are all the same concept. Students may have trouble calculating mean and median given a histogram or dot plot. ● Students may have trouble connecting that mean is the average, as it has previously been described this way.

Grade	*CCSS Domain*	*CCSS Cluster*
6	**STATISTICS & PROBABILITY**	**Summarize and describe distributions**

Cluster Standard: 6.SP.B.4

Standard	**Standards for Mathematical Practice**
Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students will develop an understanding of statistical thinking. They will use dot plots, histograms and box plots to draw inferences and make comparisons between data sets. Students should recognize that data distribution may not have a definite center and that interpreting those different measures of center can change how data gets interpreted.	• Understand and be able to calculate the measure of center, and the quartile ranges. • Understand when it is appropriate to use a dot plot, histogram and box plot. For example, a dot plot will show exact values for each piece of data, but a histogram will show how many pieces of data fell within a specific range. • Create and display data on number lines using dot plots, histograms and box plots
DOK	**Blooms**
1-2	Apply, Analyze

Grade	*CCSS Domain*	*CCSS Cluster*
6	**STATISTICS & PROBABILITY**	**Summarize and describe distribution**

Cluster Standard: 6.SP.B.5

Standard	Standards for Mathematical Practice
Summarize numerical data sets in relation to their context, such as by: **A:** Reporting the number of observations. B: Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. **C:** Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. **D:** Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students will develop an understanding of statistical thinking. They will use dot plots, histograms and box plots to draw inferences and make comparisons between data sets. Students should recognize that data distribution may not have a definite center and that interpreting those different measures of center can change how data gets interpreted.	• Correlate the number of observations to the sample size. • Express how sample size is represented in a dot plot vs histogram, vs box plot. • Identify the initial survey question as numerical vs categorical (quantitative vs qualitative) data. • Describe the data by reading the graph's labels (units used) • Use the correct context, describe the overall pattern including any striking deviations such as

	outliers. ● Compute the measures of center: median and/or mean. ● Compute the measures of variability: interquartile range and/or mean absolute deviation. ● Express how measures of center and variability change the shapes of distribution.
DOK	**Blooms**
2-3	Understand, Apply

Common Misconceptions

● Students may confuse the different visual representations (dot plot, histogram, number line, and box plots).	● When creating a box plot, students may have difficulty in correctly identifying the lower and upper quartile. Since this is median, it may need to be reinforced that data sets with even values will need to find the mean between the middle two numbers.

Student Discourse Guide

- **Purposeful, rich classroom discourse offers students the opportunity to express their ideas, thinking, and to critique the reasoning of others in a variety of ways (writing, drawing, verbal). Purposeful implementation of 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 paths to solutions and reveal knowledge or misunderstandings to educators. The process also allows educators to honor students' culture, lived experiences and evolving math identities.**
- **Discourse that focuses on tasks that promote reasoning and problem solving is a primary mechanism for developing conceptual understanding and meaningful learning of mathematics (Michaels, O'Connor, and Resnick, 2008)**

Domain: **Statistics and Probability**	Strand: **Develop understanding of statistical variability**

Suggested Student Discourse Questions

• Can you explain the similarity of how your strategy was similar to other students? • After completing solving the problem, do you think there was another approach that would have been better for solving the problem?	• What real life connections can you think of to associate with statistical variability? • How do you define statistical variability?

Domain: **Statistics and Probability**	Strand: **Summarize and describe distributions**

Suggested Student Discourse Questions

• Explain why you chose a particular type of graph to display your data? • What are the advantages and disadvantages of using a particular graph to display different types of data?	• What information from your real-life would you like to see visualized in this type of distribution? • What is the difference between mean, median, mode, range, and quartile?

ASSESSMENT GUIDE

- Develop understanding of statistical variability
- Summarize and describe distributions

Grade	*CCSS Domain*	*CCSS Strand*
6	Statistics and Probability	Develop understanding of statistical variability

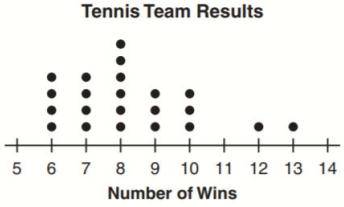
Sample Task #1 (Constructed Response)

Lisbeth owns a bookstore. She sold 87, 94, 91, and 84 books on the first 4 days of this week. Lisbeth wants to have a mean of 90 books sold after 5 days.

What is the **least** number of books Lisbeth can sell on day 5 to have a mean of 90 books sold?

Sample Task #2 (Multiple Choice)

This dot plot shows the number of wins by each player on a tennis team last season.



Which statement about the dot plot is true?

Ⓐ The spread of the data is 9 wins.

Ⓑ The data is clustered around 8 wins.

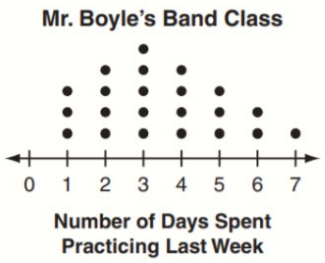
Ⓒ The tennis team has a total of 7 players.

Ⓓ The center of the data is between 9 and 10 wins.

Grade	*CCSS Domain*	*CCSS Strand*
6	Statistics and Probability	Summarize and describe distributions

Sample Task #1 (Constructed Response)

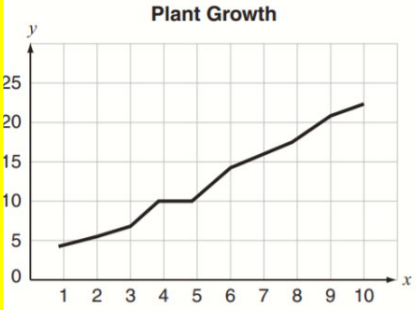
. The dot plot shows the number of days that 22 students in Mr. Boyle's band class practiced at home last week.



Mr. Boyle wants to display the data as a box plot. At what values would the box begin and end on Mr. Boyle's box plot?

Sample Task #2 (Multiple Choice)

. Marie made this line graph to represent the growth of a plant over time.



Which label is most appropriate for the vertical axis?

Ⓐ Time (weeks)
Ⓑ Types of Plants
Ⓒ Number of Plants
Ⓓ Height (centimeters)

MLSS AND CLR GUIDE

- Develop understanding of statistical variability
- Summarize and describe distributions

CCSS Domain	*CCSS Cluster*
Statistics and Probability	**Develop understanding of statistical variability**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on the development in the understanding of statistical variability, 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, students can collect or use statistical data that answers relevant questions related to their family and community culture.	
Cross-Curricular Connections	**Science:** Students can answer a question regarding their experiment by collecting data. This data can be displayed in different ways in addition to students finding the measures of center (mean and median) and describing the shape of the data. (MS-LS1-4, From Molecules to Organisms: Structures and Processes) https://www.nextgenscience.org/pe/ms-ls1-4-moleculesorganisms-structures-and-processes **English:** ● RST.6.8.3- following precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. ● RST.6.8.4- demonstrating the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grade 6-8 texts and topics. ● RST.6.8.7- distinguish among facts, reasoned judgment based on research findings, and speculations in a text. ● SL.6.1- engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners	
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*	● Tasks: The type of mathematical tasks and instruction students receive provides the foundation for students' mathematical learning and their mathematical identity. Tasks and instructions that provide greater access to mathematics and convey the creativity of mathematics by allowing for multiple solution strategies and development of the standards

	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?*	for mathematical practice lead to more students viewing themselves mathematically successful capable mathematicians than tasks and instruction which define success as memorizing and repeating a procedure demonstrated by the teacher. For example, when studying the development in the understanding of statistical variability the types of mathematical tasks are critical because students can use data that is relevant to their home, school or social culture when working with statistical variability. The power in connecting mathematics to student's personal experiences and culture can easily be accessed through choosing (or even better, allowing students to choose) topics and statistical questions that are relevant and meaningful on a personal level. As mathematics becomes more personal, students can begin to identify as a mathematician.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
● In Grade 5, learners made line plots to display a data set of measures in fractions of a unit.	● Mean, median, mode and range are new concepts to 6th grade students. Students will create dot plots, histograms and box plots. They will draw inferences and make comparisons between them. Mastery includes finding mean, median, mode and interquartile range.	● In Grade 7, learners build on their understanding of interpreting information about a population by using population samples. In Grade 7, learners begin to look at two separate data sets to make comparisons. In high school, learners interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

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 rehearses new mathematical language when studying, developing the understanding of statistical variability because students will need to become familiar with ideas around statistical data, measures of central tendency, variability and other new concepts.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	5.MD.B.2: This standard provides a foundation for work in developing the understanding of statistical variability because it focuses on 5th grade work that students have done using line plots to organize data and then fraction operations to interpret and solve problems with the 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?	For example, students may benefit from re-engaging with content during a unit on developing the understanding of statistical variability by clarifying mathematical ideas and/or concepts through a short mini-lesson because as students use statistical data to solve problems, they will need practice and clarification on using measures of central tendency and variability to decide how to most effectively describe the data. This could be done in small groups using protocols to examine data and present appropriate data to answer a question.
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 developing the understanding of statistical variability by confronting student misconceptions because there are so many new concepts in this cluster that looking at common misconceptions could help students avoid confusion. For example, students need to be clear on the difference between statistical data and categorical data and understand that only statistical data allows the use of measures of central tendency and variability to describe the data.

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?	For example, some learners may benefit from an extension such as open-ended tasks linking multiple disciplines when studying, developing the understanding of statistical variability because this cluster lends itself to using data from many sources. Students do not have to gather the data as they will in 7th grade but could use data from a current science or social studies concept to develop these skills.

CCSS Domain	*CCSS Cluster*
Statistics and Probability	**Summarize and describe distributions**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on how to summarize and describe distributions, 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 ways data collection is used in the home and community can a be a great way to connect school tasks with home tasks.
Cross-Curricular Connections	**Science:** • Students will develop a question that they can study in regard to kinetic energy and possibly how temperature changes. They will be able to look at data sets to determine the trends in the data. Specifically, students can see different results by the transfer of kinetic energy. Students can analyze the data set finding the mean, median, mean absolute deviation AND describe what these values mean in the context of the situation. (MS-PS3-4, Energy) https://www.nextgenscience.org/pe/ms-ps3-4- energy **English:** ● RST.6.8.3- following precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. ● RST.6.8.4- demonstrating the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grade 6-8 texts and topics.

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?*	• Eliciting and Using Evidence of Student Thinking: Eliciting and using student thinking can promote a classroom culture in which mistakes or errors are viewed as opportunities for learning. When student thinking is at the center of classroom activity, "it is more likely that students who have felt evaluated or judged in their past mathematical experiences will make meaningful contributions to the classroom over time." For example, when studying, summarizing, and describing distributions eliciting and using student thinking is critical because it allows for teachers to gather authentic information through formative and summative assessments that can be used to further support students' learning. During aggressive monitoring in the classroom, teachers listen carefully to student thinking and make note of which ideas to bring to the forefront of whole class discussions. It is helpful to create opportunities for students to share their thinking about distributions, their choice of measures of center and variability with their peers directly.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	***Current Learning***	***Future Learning***
• In Grade 5, learners made line plots to display a data set of measures in fractions of a unit. They will build upon this skill in 6th grade by summarizing increasingly complex data sets in different contexts.	• Students will create dot plots, histograms and box plots. They will draw inferences and make comparisons between them. Students will also learn mean, median, mode and interquartile range which will connect in this cluster.	• In Grade 7, students build on their understanding of interpreting information about a population by using population samples. In Grade 7, students begin to look at two separate data sets to make comparisons. In the high school standards, learners interpret differences in shape, center, and spread in the context of the data sets,

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 rehearses prior learning when studying how to summarize and describe distributions because it 3 allows refresher of prerequisite skills needed to be successful in understanding the whole concept like graphing on number lines.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	*5.MD.B.2 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally. This standard provides a foundation for work with summarizing and analyzing distributions because students are expected to skillfully plot data in fractions on a number line. 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 and analyzing distributions by providing specific feedback to students on their work through a short mini lesson because it enhances students' learning and achievement. The authentic, immediate feedback to students' work when provided in real-time is as powerful as catching misconception or misunderstanding that needs fixed.
Intensive	What assessment data will help identify content needing	For example, some students may benefit from intensive extra time during and after a unit on summarizing and

	to be revisited for intensive interventions?	organizing distributions by confronting student misconceptions because it allows teachers to start by asking students what they think, acknowledge the process and confront them with facts. Students are clarified when confused with the concept of "mean absolute deviation" and "mean"; not be clear about the differences between bar graphs and histograms.

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?	For example, some learners may benefit from an extension such as open-ended tasks linking multiple disciplines when studying how to summarize and analyze distributions because it provides the students with opportunities to explore and present their individual creativity. For instance, the open-ended task could be an example from Illustrative mathematics found in: http://tasks.illustrativemathematics.org/contentstandards/6/SP/B/4/tasks/2047