NEW MEXICO
Public Education Department

New Mexico Instructional S
6th Grade Geometry G

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

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

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

In this guide you will find:

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

NEW MEXICO
Public Education Department

New Mexico Instructional S
6th Grade Geometry G

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

NEW MEXICO
Public Education Department

New Mexico Instructional S
6th Grade Geometry G

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

NEW MEXICO
Public Education Department

New Mexico Instructional S
6th Grade Geometry G

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

Domain: Geometry	Strand: Solve real-world and mathematical problem 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 strat used to that of another student involving a prob related to volume?
- Do you need the same amount of paper to wra 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 betwe and surface area?

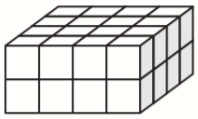
ASSESSMENT GUIDE

- 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.

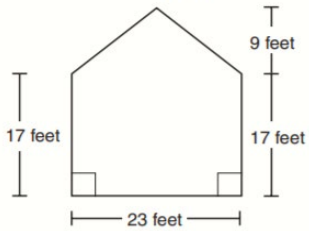


Each cube has an edge length of $\frac{1}{2}$ inch.

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 a 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 Multilayered 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.