NEW MEXICO
Public Education Department

2.G: GEOMETRY

Cluster Statement: Reason with shapes and their attributes.

Additional Cluster (Students should spend the large majority of their time (65-85%) on the major work of the grade/course. Supporting work and, where appropriate, additional work should be connected to and engage students in the major work of the grade.)

Standard Text	**Standard for Mathematical Practices**	**Students who demonstrate understanding can:**
2.G.A.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.	SMP 4: Students model with mathematics when recognizing and drawing shapes with specified attributes. SMP 6: Students attend to precision to draw shapes with specified attributes such as a given number of angles or a given number of equal faces.	• Classify shapes (Two-dimensional shapes as flat or plane shapes. Three-dimensional shapes are solid shapes.) • Identify attributes that define shapes include angles, faces, and sides. • Understand two- and three-dimensional shapes can be described and classified by their attributes. • Recognize shapes with specified attributes. • Draw shapes to represent given attributes. • Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. **Depth of Knowledge:** 1 **Bloom's Taxonomy:** understand
Standard Text	**Standard for Mathematical Practices**	**Students who demonstrate understanding can:**
2.G.A.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	SMP 4: Students model with mathematics to partition a rectangle. SMP 6: Students attend to precision when partitioning a rectangle into rows and columns of same-size squares**.**	• Explain how rectangles can be divided into rows and columns. • Understand how to explore geometric relationships • Understand how shapes can be used to explain parts of a whole or totals. • Divide a rectangle into equal rows and columns to create an array. • Determine the number of shapes in an array

<table>
<tr><td></td><td></td><td>Depth Of Knowledge: 1

Bloom's Taxonomy: understand, apply</td></tr>
<tr><td>Standard Text

2.G.A.3
Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.</td><td>Standard for Mathematical Practices

SMP 4: Students model with mathematics to partition circles and rectangles and identify their fractional parts

SMP 6: Students attend to precision when partitioning circles and rectangle into two, three, or four equal shares.</td><td>Students who demonstrate understanding can:
• Know that equal shares are made by dividing a shape evenly into multiple parts.
• Understand that exploring geometric relationships relates to reasoning skills. Shapes can be used to explain parts of a whole or totals.
• Partition circles into equal shares of two, three, or four.
• Identify equal shares using different terms.
• Explain how equal shares can have different shapes.

Depth of Knowledge: 1-2

Bloom's Taxonomy: understand, apply</td></tr>
<tr><td><u>Previous Learning Connections</u>
• In first grade, students reasoned about shapes. They described and classified shapes, including drawings, manipulatives and real-world objects, in terms of their geometric attributes (1.G.1). Within that standard, students also distinguished between defining attributes (sides, vertices) versus non-defining attributes (color, size, orientation).</td><td><u>Current Learning Connections</u>
• Connect to their previous knowledge of addition from earlier in 2nd grade (2.OA.4) to find the total number of objects arranged in rectangular arrays.</td><td><u>Future Learning Connections</u>
• Connect to their work with rectangular arrays to the concept of equal groups as multiplication (3.OA.1).
• Connect to shape categories to help form relationships among categories and subcategories (3.G.1).
• Connect to understanding of fractions to name equal parts using written fraction notation (3.NF.1, 3.G.2).</td></tr>
<tr><td colspan="3">Clarification Statement:
Students build understandings of two- and three-dimensional shapes and their properties and compose and decompose shapes. They develop connections among spatial structures.</td></tr>
<tr><td colspan="3">Common Misconceptions

Students may assume a shape with a changed orientation is no longer the same shape.</td></tr>
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Some students may fail to recognize a partitioned shape as a total of equal shares and think of the partition only as part of the whole.

Students may not be familiar with the vocabulary of halves, thirds, etc.

Multi-Layered System of Supports (MLSS)/Suggested Instructional Strategies

Pre-Teach

Pre-teach (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 uses images/resources (especially those being used the first time) when studying reasoning with shapes and their attributes because some learners may have difficulty with the names of shapes based on the attributes of the number of angles or the number of equal faces. There are additional shapes added in this grade level from previous grades, and students may need multiple exposures to the attributes and names using images/resources.

Pre-teach (intensive): *What critical understandings will prepare students to access the mathematics for this cluster?*

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Core Instruction

Access

Interest: *How will the learning for students provide multiple options for recruiting student interest?*

- For example, learners engaging and reasoning with shapes and their attributes benefit when learning experiences include ways to recruit interest such as providing choices in their learning such as using tangrams or shape manipulatives to see and feel the angles, faces, sides, etc. allows for all students to learn in their own way through touching and seeing.

Build

Effort and Persistence: *How will the learning for students provide options for sustaining effort and persistence?*

- For example, learners engaging and reasoning with shapes and their attributes benefit when learning experiences attend to students attention and affect to support sustained effort and concentration such as providing feedback that is frequent, timely, and specific because it allows for students to make mistakes, figure out how to fix their mistakes, learn new strategies, and allows for peer interactions to enhance learning.

Language and Symbols: *How will the learning for students provide alternative representations to ensure accessibility, clarity and comprehensibility for all learners? (e.g., a graph illustrating the relationship between two variables may be informative to one learner and inaccessible or puzzling to another; picture or image may carry very different meanings for learners from differing cultural or familial backgrounds)*

- For example, learners engaging and reasoning with shapes and their attributes benefit when learning experiences attend to the linguistic and nonlinguistic representations of mathematics to ensure clarity can comprehensibility for all learners such as pre-teaching

vocabulary and symbols, especially in ways that promote connection to the learners' experience and prior knowledge because pre-teaching vocabulary gives students the opportunity to identify words and then be able to place them in context and remember them and apply it to what they are working on.

Expression and Communication: *How will the learning provide multiple modalities for students to easily express knowledge, ideas, and concepts in the learning environment?*

- For example, learners engaging and reasoning with shapes and their attributes benefit when learning experiences attend to the multiple ways students can express knowledge, ideas, and concepts such as providing text-to-speech software (voice recognition), human dictation, recording because while students may be able to solve a math problem of how many angles does a hexagon have and have the skill set to do so, some students may be low literacy readers and by removing the stress of reading the problem they can focus on solving the problem.

Internalize

Comprehension: *How will the learning for students' support transforming accessible information into usable knowledge, knowledge that is accessible for future learning and decision-making?*

- For example, learners engaging and reasoning with shapes and their attributes benefit when learning experiences attend to students by intentionally building connections to prior understandings and experiences; relating important information to the learning goals; providing a process for meaning making of new learning; and, applying learning to new contexts such as providing templates, graphic organizers, concept maps to support note-taking because visuals such as graphic organizers are a helpful learning tool for students of all ages to organize, clarify, or simplify complex information—they help students construct understanding through an exploration of the relationships between concepts. They also are a useful scaffold to support student learning.

Re-teach

Re-teach (targeted): *What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisiting during a unit?*

- If students exhibit one more of these misconceptions, consider addressing the misconception by for example, students may benefit from re-engaging with content during a unit on reasoning with shapes and their attributes by clarifying mathematical ideas and/or concepts through a short mini-lesson because students will need to gain mastery of the attributes of shapes to be successful in following grades.

Re-teach (intensive): *What assessment data will help identify content needing to be revisited for intensive interventions?*

- Examine assessments for evidence of students still developing the underlying ideas, for example, some students may benefit from intensive extra time during and after a unit reasoning with shapes and their attributes by offering opportunities to understand and explore different strategies because students may be visualizing shapes differently. When offered opportunities to understand and explore different strategies (composing and decomposing shapes, manipulatives that can be used to create shapes, etc.) students gain a better understanding of reasoning with shapes and their attributes.

Extension

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 reasoning with shapes and their attributes because "Students learn to combine their composition and decomposition competencies

	to build and operate on composite units (units of units), intentionally substituting arrangements or composites of smaller shapes or substituting several larger shapes for many smaller shapes, using geometric knowledge and spatial reasoning to develop foundations for area, fraction, and proportion. They recognize that the hexagonal faces of these constructions have equal area, that each trapezoid has half of that area, and each rhombus has a third of that area."

Culturally and Linguistically Responsive Instruction:

Validate/Affirm: 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?
Build/Bridge: 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?

Task: The type of mathematical tasks and instruction students receive provides the foundation for students' mathematical learning and their mathematical identity. Tasks and instruction that provide greater access to the mathematics and convey the creativity of mathematics by allowing for multiple solution strategies and development of the standards 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 reasoning with shapes and their attributes the types of mathematical tasks are critical because learners from a variety of cultural backgrounds may identify a variety of strategies and visual representations of the shapes and their attributes through spatial reasoning, mathematical knowledge, and artistic aptitudes.

Standards Aligned Instructionally Embedded Formative Assessment Resources:
Source: http://tasks.illustrativemathematics.org/content-standards/2/G/A/2/tasks/2063
This type of assessment question requires students to divide a rectangle into squares and explore the different ways to count the area squares.
This task allows you to assess student's ability to reason with shapes and skip count.

Relevance to families and communities:	**Cross-Curricular Connections:**
During a unit focused on reasoning with shapes and their attributes, 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 structures for the shape names across the languages in your classroom can lead to a more robust understanding of shapes for all students by making connections to the different structures of shape-names in other languages.	Science: Students can describe and classify different kinds of materials by their observable properties.