NEW MEXICO
Public Education Department

5.G.B: GEOMETRY

Cluster Statement: Classify two-dimensional figures into categories based on their properties.
Additional Cluster: This standard represents additional work for this grade. As a reminder, 65-85% of instructional time over the course of the year should be focused on the major work of the grade.

Standard Text	**Standards of Mathematical Practice**	**Students who Demonstrate Understanding Can:**
5. G.B.3 Classify two-dimensional figures into categories based on their properties. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.	**SMP 1: Make sense of problems and persevere in solving them.** - Students can become problem solvers as they reason about shapes to create a graphic organizer to classify shapes. Teacher must focus on helping students reason about attributes (properties) of shapes, including sides, angles, and symmetry. **SMP 6: Attend to precision.** - Students can use clear, specific language when discussing their reasoning about shapes. Focus on vocabulary associated with the properties of shapes, including attribute, category, subset/subcategory, properties, two-dimensional, polygon, rhombus, rectangle, square, triangle, quadrilateral, pentagon, hexagon, trapezoid, parallel, perpendicular, congruent angles, right angles, acute angles, obtuse angles, symmetry, line, and line segment. **SMP 8: Look for and make use of structure.** -Students can identify attributes to classify and create a graphic organizer to help them make sense of the hierarchy of shapes. Source: The Common Core Mathematics Companion: The Standards Decoded	• Recognize that some two-dimensional shapes can be classified into more than one category based on their attributes. • Recognize if a two-dimensional shape is classified into a category, that it belongs to all subcategories of that category. **Depth of Knowledge:** 1, 2, 3 **Bloom's Taxonomy:** Understand
Standard Text	**Standards of Mathematical Practice**	**Students who Demonstrate Can:**
5.G.B.4 Classify two-dimensional figures into categories based on		• Recognize the hierarchy of two-dimensional shapes based on their attributes.

their properties. Classify two-dimensional figures in a hierarchy based on properties.	**SMP 2: Reason abstractly and quantitatively.** Students use their understanding of shapes to defend their reasoning about shapes. For example, by asking how they might prove whether a square is *always* a rectangle and whether a rectangle is always a square. **SMP 3: Construct viable arguments and critique the reasoning of others.** Students engage in a debate to defend whether a parallelogram is also a trapezoid. Students use vocabulary to defend their thinking. Teachers can use the example in you tube *Constructing viable arguments-triangles or trapezoid.wmv* **SMP 7: Look for and make use of structure.** Students classify shapes by their features or characteristics, such as by the number of vertices, angle measurement, sets of parallel lines, whether they are polygons, etc. Students can notice a pattern that may be generalized as real-world problems are represented on the coordinate plane.	• Analyze properties of two-dimensional figures in order to place into a hierarchy. • Classify two-dimensional figures into categories and/or subcategories based on their attributes. **Depth of Knowledge:** 1, 2 **Bloom's Taxonomy:** Understand
<u>Previous Learning Connections</u> • Connect to learning that shapes in different categories share attributes. (2.G.1) • Connect to learning that shared attributes can define a larger category. For example, rectangles, squares, and rhombuses are all examples of quadrilaterals. (3.G.1) • Connect to classifying two-dimensional figures based on lines and angles. (4.G.2)	**<u>Current Learning Connections</u>**	**<u>Future Learning Connections</u>** • Connect to drawing shapes with given conditions. (7.G.2)
Clarification Statement: 5.G.B.3: This standard calls for students to reason about the attributes (properties) of shapes. Student should have experiences discussing the property of shapes and reasoning. The notion of congruence ("same size and same shape") may be part of classroom conversation but the concepts of congruence and similarity do not appear until middle school. 5.G.B.4: This standard builds on what was done in 4th grade. Figures from previous grades: polygon, rhombus/rhombi, rectangle, square, triangle, quadrilateral, pentagon, hexagon, cube, trapezoid, half/quarter circle,		

circle, kite. A kite is a quadrilateral whose four sides can be grouped into two pairs of equal-length sides that are beside (adjacent to) each other. Student should be able to reason about the attributes of shapes by examining: What are ways to classify triangles? Why can't trapezoids and kites be classified as parallelograms? Which quadrilaterals have opposite angles congruent and why is this true of certain quadrilaterals, and How many lines of symmetry does a regular polygon have?
Note, in the U.S., the term "trapezoid" may have two different meanings. Research identifies these as inclusive and exclusive definitions. The inclusive definition states: A trapezoid is a quadrilateral with at least one pair of parallel sides. The exclusive definition states: A trapezoid is a quadrilateral with exactly one pair of parallel sides. With this definition, a parallelogram is not a trapezoid. North Carolina has adopted the exclusive definition. (Progressions for the CCSSM: Geometry, The Common Core Standards Writing Team, June 2012.)

Common Misconceptions

- Students may think that when describing geometric shapes and placing them in subcategories, the last category is the only classification that can be used.

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 rehearsing new mathematical language when studying Classifying Two-Dimensional Figures Into Categories Based On Their Properties because this cluster is rich in mathematical vocabulary that may be confusing for some students.

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

- 2.G.A.1: This standard provides a foundation for work with <mathematics of the assigned cluster> because its roots begin in 2nd grade where students recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces . 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.

Core Instruction

Access

Physical Action: How will the learning for students provide a variety of methods for navigation to support access?

- For example, learners engaging with classifying two-dimensional figures into categories based on their properties benefit when learning experiences ensure information is accessible to learners through a variety of methods for navigation, such as <varying methods for response and navigation by providing manipulatives because allowing the students to physically manipulate and sort the geometric shapes into categories and subcategories will deepen their understanding as they may need to touch and turn the shoes to help determine the properties.

Build

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

- For example, learners engaging with classifying two-dimensional figures into categories based on their properties benefit when learning experiences attend to students attention and affect to support sustained effort and concentration such as encouraging and supporting opportunities for peer interactions and supports (e.g., peer-tutors) because of the extensive amount of mathematics vocabulary in this cluster.

Students will benefit from working with a partner to talk through the reasoning behind their identification of the shapes and their attributes as they increase their vocabulary knowledge.

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 with classifying two-dimensional figures into categories based on their properties 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 and providing graphic symbols with alternative text descriptions because attribute descriptions may be confusing for some learners. It is recommended to create a series of anchor charts for students to refer to which differentiate and review the types of angles, types of lines, and categories of polygons.

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 with classifying two-dimensional figures into categories based on their properties benefit when learning experiences attend to the multiple ways students can express knowledge, ideas, and concepts such as using physical manipulatives (e.g., blocks, 3D models, base-ten blocks) because students may benefit from physically sorting shapes or shape cards into the various categories and subcategories as they discuss their reasoning with their peers.

Internalize

Executive Functions: *How will the learning for students support the development of executive functions to allow them to take advantage of their environment?*

- For example, learners engaging with classifying two-dimensional figures into categories based on their properties benefit when learning experiences provide opportunities for students to set goals; formulate plans; use tool and processes to support organization and memory; and analyze their growth in learning and how to build from it such as

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?*

- For example, students may benefit from re-engaging with content during a unit on Classifying Two-Dimensional Figures Into Categories Based On Their Properties by clarifying mathematical ideas and/or concepts through a short mini-lesson because students may have a difficult time understanding that figures can belong to more than one category, based on their attributes. For example, squares also belong to the following categories: quadrilaterals, rectangles, and parallelograms.

Re-teach (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 Classifying Two-Dimensional Figures Into Categories Based On Their Properties by helping students move from specific answers to generalizations because the more ways students can classify and reason about shapes, the

better they will understand their properties. Lead students into answering questions like, "Why is a square always a triangle?" and "Why is a rectangle not always a square?".

Extension Ideas

What type of extension will offer additional challenges to 'broaden' your student's knowledge of the mathematics developed within your HQIM?

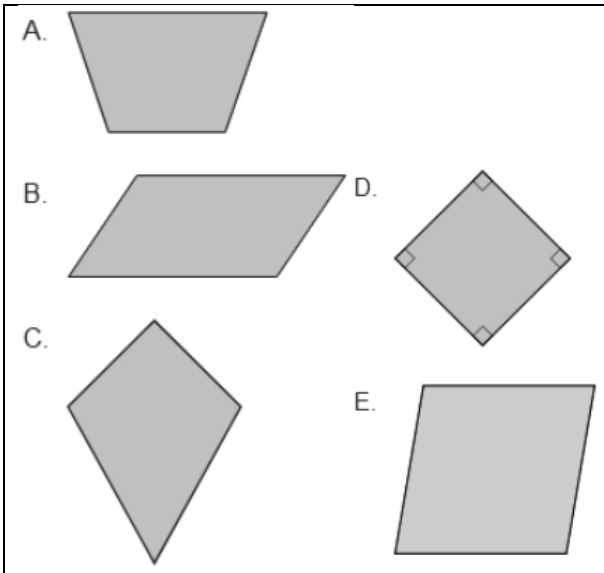
- For example, some learners may benefit from an extension such as the opportunity to understand concepts more quickly and explore them in greater depth than other students when studying Classifying Two-Dimensional Figures Into Categories Based On Their Properties because students can extend thinking using graphic organizers, such as flow charts or T-charts, to compare and contrast the attributes of geometric figures. (Students need not be limited to quadrilaterals).

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?

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 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 classifying two-dimensional figures into categories based on their properties facilitating meaningful mathematical discourse is critical because this cluster requires students to reason about the attributes of shapes. Students need ample opportunity to discuss with peers the properties and attributes of shapes to develop understanding. Lead discussions asking students to not only talk about the properties of polygons, but also to reason about the attributes of each shape and how each shape should be classified. Students should also be able to explain why some shapes fit into subcategories.

Standards Aligned Instructionally Embedded Formative Assessment Resources:
Source: PARCC Released Item 2018
Which shapes are parallelograms but not rectangles?
Select **two** correct shapes



Answer Key: B and E

Relevance to families and communities:	**Cross-Curricular Connections:**
During a unit focused on classifying two-dimensional figures into categories based on their properties, 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, have your student identify different shapes in the home and community environment Ask your student to describe the shape based on the number of sides and angles and ask if they can tell you what categories(s) that shape fits into.	Art: Provide students with multiple colors and textures of paper. Have them work in groups to create collages based on the attributes of different shapes. Give students strips of paper that give examples of different shapes. Allow them to create their collages based on the attributes given. History and Architecture: Have students study the shapes of historical dwellings/buildings. Have students make connections to the building in their communities. Discuss why certain shapes may have been more fitting than others for various buildings. Have students describe the dwellings/building based on their attributes.