



National Center and State Collaborative

Core Content Connectors: Geometry

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National Center and State Collaborative

The National Center and State Collaborative (NCSC) is applying the lessons learned from the past decade of research on alternate assessments based on alternate achievement standards (AA-AAS) to develop a multi-state comprehensive assessment system for students with significant cognitive disabilities. The project draws on a strong research base to develop an AA-AAS that is built from the ground up on powerful validity arguments linked to clear learning outcomes and defensible assessment results, to complement the work of the Race to the Top Common State Assessment Program (RTTA) consortia.

Our long-term goal is to ensure that students with significant cognitive disabilities achieve increasingly higher academic outcomes and leave high school ready for post-secondary options. A well-designed summative assessment alone is insufficient to achieve that goal. Thus, NCSC is developing a full system intended to support educators, which includes formative assessment tools and strategies, professional development on appropriate interim uses of data for progress monitoring, and management systems to ease the burdens of administration and documentation. All partners share a commitment to the research-to-practice focus of the project and the development of a comprehensive model of curriculum, instruction, assessment, and supportive professional development. These supports will improve the alignment of the entire system and strengthen the validity of inferences of the system of assessments.



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This document is available in alternative formats upon request.

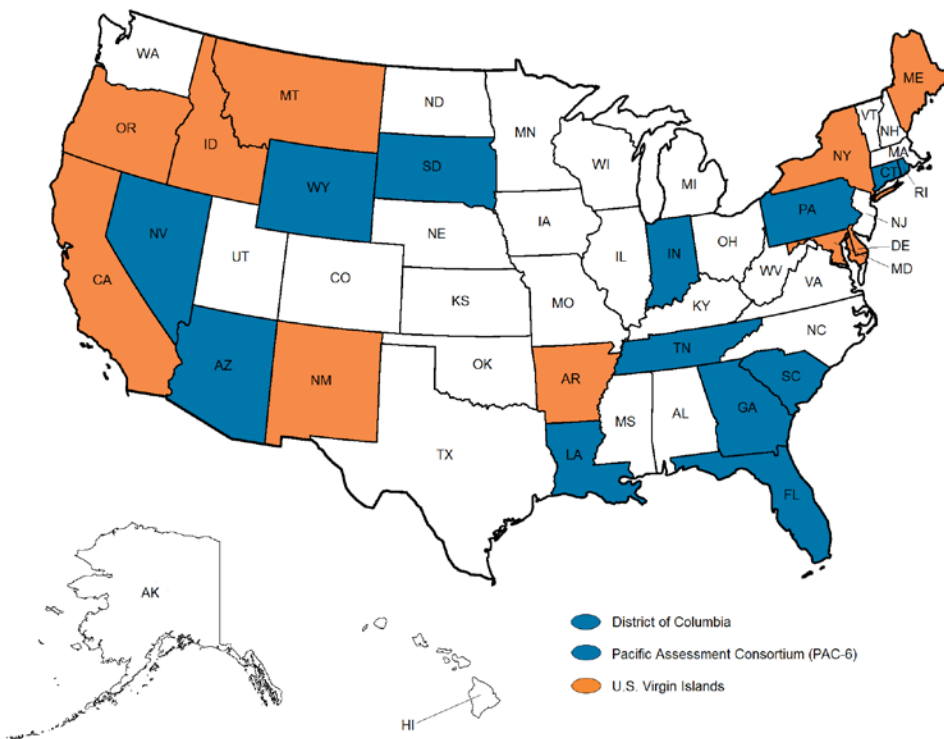


National Center and State Collaborative

NCSC is a collaborative of 15 states and five organizations.

The states include (shown in blue on map): Arizona, Connecticut, District of Columbia, Florida, Georgia, Indiana, Louisiana, Nevada, Pacific Assessment Consortium (PAC-6)¹, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, and Wyoming.

Tier II states are partners in curriculum, instruction, and professional development implementation but are not part of the assessment development work. They are (shown in orange on map): Arkansas, California, Delaware, Idaho, Maine, Maryland, Montana, New Mexico, New York, Oregon, and U.S. Virgin Islands.



*Core partner states are blue in color and Tier II states are orange in color.

¹ The Pacific Assessment Consortium (including the entities of American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Guam, Republic of Palau, and Republic of the Marshall Islands) partner with NCSC as one state, led by the University of Guam Center for Excellence in Developmental Disabilities Education, Research, and Service (CEDDERS).



National Center and State Collaborative

The five partner organizations include: The National Center on Educational Outcomes (NCEO) at the University of Minnesota, The National Center for the Improvement of Educational Assessment (Center for Assessment), The University of North Carolina at Charlotte, The University of Kentucky, and edCount, LLC.



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Core Content Connectors: Geometry

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Identifying the Core Content of the Learning Progressions Framework for the Common Core State Standards for Students Who Participate in AA-AAS

Introduction

The purpose of this paper is to describe the development and prioritization of the academic content for students with significant cognitive disabilities. This prioritized academic content is referred to as Core Content Connectors (CCCs). This work is part of the NCSC GSEG and provides the foundation for the development of curriculum resources, professional development, instructional resources, and alternate assessment based on alternate achievement standards (AA-AAS). A unique feature of the development and prioritization of academic content is the use of learning progressions framework (LPF), which is built to include relationships with the Common Core State Standards (CCSSs). The LPF does not provide details of grade-specific curriculum, but describes a path for student learning as an ongoing developmental progression and is a starting point for thinking about how students develop competency in an academic domain (Hess, 2010). The following sections describe the use of LPFs for identifying specific grade-level Common Core State Standards (CCSS), and the development of the CCCs for providing more specificity for teachers.

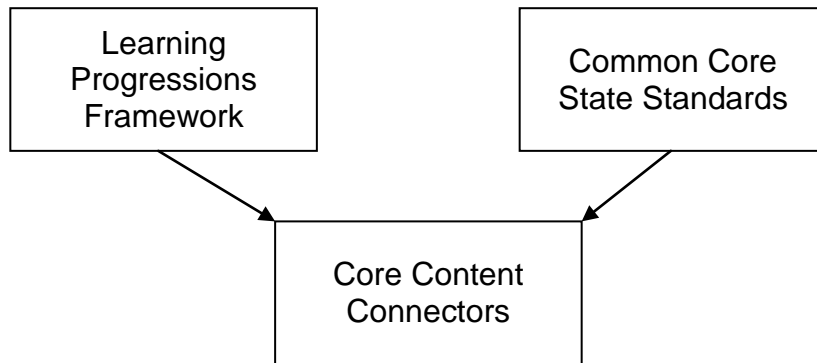
Learning Progression Framework

The National Alternate Assessment Center, under the leadership of Karin Hess, developed LPFs. Hess's (2008) definition of LPs is based on four interrelated guiding principles: (a) LPs are developed and refined using available research and evidence, (b) LPs have clear binding threads that articulate the essential core concepts and processes of a discipline sometimes referred to as the "big ideas" of the discipline, (c) LPs articulate movement towards increased understanding, and (d) LPs go hand-in-hand with well-designed and aligned assessments.

The grade span learning targets of the LPF were identified by national content experts and are a broad description of the essential content and general sequencing for student learning and skill development. The LPF does not provide details of grade-specific curriculum, but describes a path for student learning as an ongoing developmental progression. The LPF is currently available at http://www.nciea.org/publications/Math_LPF_KH11.pdf

Core Content Connectors

The Core Content Connectors (CCCs) are the prioritized academic content designed to frame the instruction and assessment of students with significant cognitive disabilities. The CCCs create a connection between the Learning Progressions Framework (LPF) and Common Core State Standards (CCSS) for these students.



The purpose of the CCCs is to identify the most salient core academic content in ELA and math found in both the CCSS and the LPF Progress Indicators (LPF PIs) (i.e., observable learning along the learning continuum for each strand in the LPFs). The CCCs illustrate the necessary knowledge and skills students with significant cognitive disabilities need to reach the learning targets or critical big ideas within the Learning Progression Frameworks (LPF, Hess et al., 2010) and the Common Core State Standard. This identified core content serves as a connection or stage between the LPF (designed for typically developing students) and the CCSS (which define grade level content and achievement). The CCCs are intentionally dually aligned with both the LPFs and the CCSSs. The CCCs identify priorities for the instruction for students in this population, and the alternate assessment. CCCs are designed to contribute to a fully aligned system of content, instruction, and assessment.

Progress Indicator: M.NO.1e describing, representing, and comparing absolute value relationships		
Core Content Connectors: 6	CCSS Domain/Cluster	Common Core State Standard
6.NO.1e1 Determine the meaning of absolute value	Expressions and Equations 6 NS Apply and extend previous understandings of numbers to the system of rational numbers.	6.NS.7c Understand ordering and absolute value of rational numbers. a) 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.
Progress Indicator: M.NO.1f recognizing equivalence of representations using fractions, decimals, and percents and using them solve ratio problems		
Core Content Connectors: 6	CCSS Domain/Cluster	Common Core State Standard
6.NO.1f1 Find a percent of a quantity as rate per 100	Ratios and Proportional Relationships 6 RP Understand ratio concepts and use ratio reasoning to solve problems.	6.RP.3c 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. c) Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
6.NO.1f2 Write or select a ratio to match a given statement and representation	Ratios and Proportional Relationships 6 RP Understand ratio concepts and use ratio reasoning to solve problems.	6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."
6.NO.1f3 Select or make a statement to interpret a given ratio	Ratios and Proportional Relationships 6 RP Understand ratio concepts and use ratio reasoning to solve problems.	6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."

The CCCs preserve the sequence of learning outlined in the LPFs to the extent possible while disaggregating the progress indicators (which describe concepts and skills along the learning continuum for each grade span in the learning progression) into teachable and assessable segments of content. The connectors and corresponding curriculum resource guides were written to help promote how students can engage in the CCSS while following the learning progression.

The CCCs have the following characteristics:

- Sequenced according to the LPFs to help guide meaningful instruction for students and lead to enduring skills in successive grades
- Written as outcome based, which provides a description of what students should know and do
- Written at high levels of expectations for students to eliminate potential ceiling effect for student learning
- Aligned to the grade-level CCSSs to provide access to the general curriculum
- Organized by the six major LPF strands (Symbolic Expression; Nature of Numbers & Operations; Measurement; Patterns, Relations, & Functions; Geometry; and Data Analysis, Probability, & Statistics)

In some grades, CCCs were developed that were considered important for student learning but were not aligned to the LPF. CCCs for some prerequisite skills were included in some of the grades, but these CCCs are for instructional purposes and not intended as a target for assessment. At the high school level, where only one AA-AAS will be administered to students but many CCSSs and LPFs are provided, some subsets of LPF Progress Indicators were selected for developing CCCs.

All CCCs will be provided by the curriculum and instruction work group in NCSC. While states may add additional content standards as they deem necessary that is specific to the needs, states and teachers will NOT have to develop any further CCCs. The complete set will be disseminated upon completion and validation. It is anticipated that states who have adopted the Common Core State Standards can use the CCCs as the priorities for students who take AA-AAS and will not need to create other forms of translations or create extensions of the Common Core unless they choose to do so. Teachers will be able to use these, along with the various curriculum resources, to plan instruction.

Uses of the document

There are several potential uses for this document. The first is to demonstrate how the identified core content builds critical big ideas across the grades. The format is intended to show how students can grow within the linked content across the grades and the connections between the related content to help guide sequential and meaningful instructional efforts. The second potential use is to provide clarity and specificity of the content within each grade level. In the process of identifying the CCC within each of the PI, it was evident that some considerations were necessary related to the content. First, it is necessary to disaggregate the content within some of the PI to a finer grain size. As students with significant cognitive disabilities may require instruction on single concepts, PIs that include multiple concepts may need to be separated in the unpacked content. Additionally, identifying core content requires focusing on the critical big ideas within the content and the need for considering meaningful instructional context within the instruction of students who participate in the alternate assessment. The third use for this document is to demonstrate how the CCCs have direct links to the CCSS. The CCSS that are identified as having the closest match are listed beside the corresponding CCC. As these direct links indicate, the CCC are not weakly linked or “watered down” translations, but instead pinpoint the most salient content in the standard. The potential users of this document ranges from assessment designers to teachers. While the document is not intended to be a standalone instructional resource, it is intended to support teachers in their understanding of the content.

References

- Hess, K. (2010, December). *Learning progressions frameworks designed for use with the Common Core State Standards in mathematics K-12*. National Alternate Assessment Center at the University of Kentucky and the National Center for the Improvement of Educational Assessment, Dover, N.H.
- Hess, K. (2008). Developing and using learning progressions as a schema for measuring progress [online]. Retrieved from http://www.nciea.org/publications/CCSSO2_KH08.pdf

	(K-4) Elementary School Learning Targets		(5-8) Middle School Learning Targets		(9-12) High School Learning Targets
	<p>E.GM-1 Recognize that two- and three-dimensional shapes have particular attributes:</p> <ul style="list-style-type: none"> Describe and compare objects and figures based on reasoning and the properties and attributes of the shapes; Compose, decompose, and draw figures based on spatial reasoning and the properties and attributes of the shapes; Apply concepts of symmetry. 		<p>GM-1 Apply reasoning using properties of two- and three-dimensional shapes to analyze, represent, and model geometric relationships:</p> <ul style="list-style-type: none"> Classify objects based on attributes and properties and solve problems using geometric relationships and properties; Decompose figures into new figures and construct figures with given conditions; Apply concepts of parallel and perpendicular. 		<p>H.GM-1 Explain solutions using geometric attributes and relationships in diverse contexts:</p> <ul style="list-style-type: none"> Extend understanding of congruence and similarity working with complex figures and situations; Solve problems involving quadrilaterals and triangles; Perform geometric constructions and use informal proofs to describe relationships and transformations
	Grades K-2	Grades 3-4	Grades 5-6	Grades 7-8	HS
Properties and attributes of shapes and figures and their corresponding parts	<p>K.GM.1a1 Recognize two-dimensional shapes (e.g., circle, square, triangle, rectangle) regardless of orientation of size</p>	<p>3.GM.1h1 Identify shared attributes of shapes</p>	<p>5.GM.1a1 Recognize properties of simple plane figures</p>	<p>7.GM.1e1 Construct or draw plane figures using properties</p>	<p>H.GM.1e1 Make formal geometric constructions with a variety of tools and methods</p>
	<p>K.GM.1a2 Recognize two-dimensional shapes in environment regardless of orientation of size</p>	<p>4.GM.1h2 Classify two-dimensional shapes based on attributes (# of angles)</p>	<p>5.GM.1b1 Distinguish plane figures by their properties</p>	<p>8.GM.1g1 Recognize congruent and similar figures</p>	<p>H.GM.1b1 Use definitions to determine congruency and similarity of figures</p>
	<p>K.GM.1a3 Use spatial language (e.g., above, below, etc.) to describe two-dimensional shapes</p>				

	(K-4) Elementary School Learning Targets		(5-8) Middle School Learning Targets		(9-12) High School Learning Targets
	<p>E.GM-1 Recognize that two- and three-dimensional shapes have particular attributes:</p> <ul style="list-style-type: none"> Describe and compare objects and figures based on reasoning and the properties and attributes of the shapes; Compose, decompose, and draw figures based on spatial reasoning and the properties and attributes of the shapes; Apply concepts of symmetry. 		<p>GM-1 Apply reasoning using properties of two- and three-dimensional shapes to analyze, represent, and model geometric relationships:</p> <ul style="list-style-type: none"> Classify objects based on attributes and properties and solve problems using geometric relationships and properties; Decompose figures into new figures and construct figures with given conditions; Apply concepts of parallel and perpendicular. 		<p>H.GM-1 Explain solutions using geometric attributes and relationships in diverse contexts:</p> <ul style="list-style-type: none"> Extend understanding of congruence and similarity working with complex figures and situations; Solve problems involving quadrilaterals and triangles; Perform geometric constructions and use informal proofs to describe relationships and transformations
	Grades K-2	Grades 3-4	Grades 5-6	Grades 7-8	HS
	2.GM.1a4 Identify two-dimensional shapes such as rhombus, pentagons, hexagons, octagon, ovals, equilateral, isosceles, and scalene triangles				
	1.GM.1b1 Identify shapes as two-dimensional (lying flat) or three-dimensional (solid)				
	1.GM.1b2 Distinguish two-dimensional shapes based upon their attributes (i.e., size, corners, and points)	4.GM.1j1 Recognize a point, line and line segment, rays in two-dimensional figures			

	(K-4) Elementary School Learning Targets		(5-8) Middle School Learning Targets		(9-12) High School Learning Targets
	<p>E.GM-1 Recognize that two-and three-dimensional shapes have particular attributes:</p> <ul style="list-style-type: none"> Describe and compare objects and figures based on reasoning and the properties and attributes of the shapes; Compose, decompose, and draw figures based on spatial reasoning and the properties and attributes of the shapes; Apply concepts of symmetry. 		<p>GM-1 Apply reasoning using properties of two- and three-dimensional shapes to analyze, represent, and model geometric relationships:</p> <ul style="list-style-type: none"> Classify objects based on attributes and properties and solve problems using geometric relationships and properties; Decompose figures into new figures and construct figures with given conditions; Apply concepts of parallel and perpendicular. 		<p>H.GM-1 Explain solutions using geometric attributes and relationships in diverse contexts:</p> <ul style="list-style-type: none"> Extend understanding of congruence and similarity working with complex figures and situations; Solve problems involving quadrilaterals and triangles; Perform geometric constructions and use informal proofs to describe relationships and transformations
	Grades K-2	Grades 3-4	Grades 5-6	Grades 7-8	HS
	<p>2.GM.1b3 Distinguish two- or three-dimensional shapes based upon their attributes (i.e., # of sides, even or different lengths, # of faces, # of corners)</p>	<p>4.GM.1j2 Recognize perpendicular and parallel lines in two-dimensional figures</p>	<p>5.GM.1j1 Recognize parallel and perpendicular lines within the context of figures</p>		
	<p>K.GM.1c1 Compose a larger shape from smaller shapes</p>	<p>4.GM.1j3 Recognize an angle in two-dimensional figures</p>			
	<p>1.GM.1c 2 Compose or recognize two-and three-dimensional shapes</p>				
	<p>2.GM.1d1 Compose three-dimensional shapes</p>	<p>4.GM.1j4 Categorize angles as right, acute, or obtuse</p>			

	(K-4) Elementary School Learning Targets		(5-8) Middle School Learning Targets		(9-12) High School Learning Targets
	<p>E.GM-1 Recognize that two-and three-dimensional shapes have particular attributes:</p> <ul style="list-style-type: none"> Describe and compare objects and figures based on reasoning and the properties and attributes of the shapes; Compose, decompose, and draw figures based on spatial reasoning and the properties and attributes of the shapes; Apply concepts of symmetry. 		<p>GM-1 Apply reasoning using properties of two- and three-dimensional shapes to analyze, represent, and model geometric relationships:</p> <ul style="list-style-type: none"> Classify objects based on attributes and properties and solve problems using geometric relationships and properties; Decompose figures into new figures and construct figures with given conditions; Apply concepts of parallel and perpendicular. 		<p>H.GM-1 Explain solutions using geometric attributes and relationships in diverse contexts:</p> <ul style="list-style-type: none"> Extend understanding of congruence and similarity working with complex figures and situations; Solve problems involving quadrilaterals and triangles; Perform geometric constructions and use informal proofs to describe relationships and transformations
	Grades K-2	Grades 3-4	Grades 5-6	Grades 7-8	HS
	2.GM.1e1 Draw two-dimensional shapes with specific attributes	4.GM.1k1 Recognize a line of symmetry in a figure			
Transformation in the Coordinate Plane			5.GM.1c1 Locate the x and y axis on a graph	8.GM.1i1 Identify supplementary angles	
			5.GM.1c2 Locate points on a graph	8.GM.1i2 Identify complimentary angles	
			5.GM.1c3 Use order pairs to graph given points	8.GM.1i3 Identify adjacent angles	
			6.GM.1c4 Locate points on a graph	8.GM.1i4 Use angle relationships to find the value of a missing angle	
			6.GM.1c5 Use order pairs to graph given points	8.GM.1f1 Recognize a rotation, reflection, or translation of a figure	H.GM.1c 1 Construct, draw or recognize a figure after its rotation, reflection, or translation

	(K-4) Elementary School Learning Targets		(5-8) Middle School Learning Targets		(9-12) High School Learning Targets
	<p>E.GM-1 Recognize that two-and three-dimensional shapes have particular attributes:</p> <ul style="list-style-type: none"> Describe and compare objects and figures based on reasoning and the properties and attributes of the shapes; Compose, decompose, and draw figures based on spatial reasoning and the properties and attributes of the shapes; Apply concepts of symmetry. 		<p>GM-1 Apply reasoning using properties of two- and three-dimensional shapes to analyze, represent, and model geometric relationships:</p> <ul style="list-style-type: none"> Classify objects based on attributes and properties and solve problems using geometric relationships and properties; Decompose figures into new figures and construct figures with given conditions; Apply concepts of parallel and perpendicular. 		<p>H.GM-1 Explain solutions using geometric attributes and relationships in diverse contexts:</p> <ul style="list-style-type: none"> Extend understanding of congruence and similarity working with complex figures and situations; Solve problems involving quadrilaterals and triangles; Perform geometric constructions and use informal proofs to describe relationships and transformations
	Grades K-2	Grades 3-4	Grades 5-6	Grades 7-8	HS
			6.GM.1c6 Find coordinate values of points in the context of a situation	8.GM.1f2 Identify a rotation, reflection, or translation of a plane figure when given coordinates	H.GM.1d1 Use the translations, reflections, rotations and dilations in the coordinate plane to solve problems with right angles
			6.GM.1c7 Use coordinate points to draw polygons		
			6.GM.1c8 Use coordinate points to find the side lengths of polygons that are horizontal or vertical		
Mathematical operations using shapes and figures	1.GM.1f1 Partition circles and rectangles into two equal parts			7.GM.1h1 Add the area of each face of a prism to find surface area of three-dimensional objects	
	2.GM.1f2 Partition circles and rectangles into 2 and 4 equal parts	3.GM.1i 1 Partition shapes into equal parts with equal area	6.GM.1d1 Find area of quadrilaterals	7.GM.1h2 Find the surface area of three-dimensional figures using nets of	

	(K-4) Elementary School Learning Targets		(5-8) Middle School Learning Targets		(9-12) High School Learning Targets
	<p>E.GM-1 Recognize that two-and three-dimensional shapes have particular attributes:</p> <ul style="list-style-type: none"> Describe and compare objects and figures based on reasoning and the properties and attributes of the shapes; Compose, decompose, and draw figures based on spatial reasoning and the properties and attributes of the shapes; Apply concepts of symmetry. 		<p>GM-1 Apply reasoning using properties of two- and three-dimensional shapes to analyze, represent, and model geometric relationships:</p> <ul style="list-style-type: none"> Classify objects based on attributes and properties and solve problems using geometric relationships and properties; Decompose figures into new figures and construct figures with given conditions; Apply concepts of parallel and perpendicular. 		<p>H.GM-1 Explain solutions using geometric attributes and relationships in diverse contexts:</p> <ul style="list-style-type: none"> Extend understanding of congruence and similarity working with complex figures and situations; Solve problems involving quadrilaterals and triangles; Perform geometric constructions and use informal proofs to describe relationships and transformations
	Grades K-2	Grades 3-4	Grades 5-6	Grades 7-8	HS
				rectangles or triangles	
	2. GM.1f3 Label a partitioned shape (e.g., one whole rectangle was separated into 2 halves, one whole circle was separated into three thirds)		6.GM.1d2 Find area of triangles	7.GM.1h3 Find area of plane figures and surface area of solid figures (quadrilaterals)	
				7.GM.1h4 Find area of an equilateral, isosceles, and scalene triangle	
				8.GM.1j1 Find the hypotenuse of a two-dimensional right triangle (Pythagorean Theorem)	H.GM.1a1 Find hypotenuse of a two-dimensional right triangle (Pythagorean Theorem)

	(K-4) Elementary School Learning Targets		(5-8) Middle School Learning Targets		(9-12) High School Learning Targets
	<p>E.GM-1 Recognize that two-and three-dimensional shapes have particular attributes:</p> <ul style="list-style-type: none"> Describe and compare objects and figures based on reasoning and the properties and attributes of the shapes; Compose, decompose, and draw figures based on spatial reasoning and the properties and attributes of the shapes; Apply concepts of symmetry. 		<p>GM-1 Apply reasoning using properties of two- and three-dimensional shapes to analyze, represent, and model geometric relationships:</p> <ul style="list-style-type: none"> Classify objects based on attributes and properties and solve problems using geometric relationships and properties; Decompose figures into new figures and construct figures with given conditions; Apply concepts of parallel and perpendicular. 		<p>H.GM-1 Explain solutions using geometric attributes and relationships in diverse contexts:</p> <ul style="list-style-type: none"> Extend understanding of congruence and similarity working with complex figures and situations; Solve problems involving quadrilaterals and triangles; Perform geometric constructions and use informal proofs to describe relationships and transformations
	Grades K-2	Grades 3-4	Grades 5-6	Grades 7-8	HS
				8.GM.1j2 Find the missing side lengths of a two-dimensional right triangle (Pythagorean Theorem)	H.GM.1a2 Find any missing side lengths of a two-dimensional right triangle (Pythagorean Theorem)

Progress Indicator: E.GM.1a recognizing, describing (using spatial language) and naming shapes regardless of orientation or size and locating shapes in the environment		
Core Content Connectors: K	CCSS Domain/Cluster	Common Core State Standard
K.GM.1a1 Recognize two-dimensional shapes (e.g., circle, square, triangle, rectangle) regardless of orientation or size	Geometry K G Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres)	K.G.2 Correctly name shapes regardless of their orientations or overall size.
K.GM.1a2 Recognize two-dimensional shapes in environment regardless of orientation or size	Geometry K G Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres)	K.G.1 Describe objects in the environment using names of shapes, and describe the relative position of these objects using terms such as <i>above, below, beside, in front of, behind, and next to</i> .
K.GM.1a3 Use spatial language (e.g., above, below, etc.) to describe two-dimensional shapes	Geometry K G Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres)	K.G.1 Describe objects in the environment using names of shapes, and describe the relative position of these objects using terms such as <i>above, below, beside, in front of, behind, and next to</i> .
Progress Indicator: E.GM.1c composing two-dimensional shapes (rectangles, squares, triangles, half-circles, and quarter circles)		
Core Content Connectors: K	CCSS Domain/Cluster	Common Core State Standard
K.GM.1c 1 Compose a larger shape from smaller shapes	Geometry K G Analyze, compare, create, and compose shapes.	K.G.6 Compose simple shapes to form larger shapes. <i>For example, “Can you join these two triangles with full sides touching to make a rectangle?”</i>
Explanations and clarifications: CCSS not addressed: K.G.4 Analyze and compare two and three dimensional shapes in different sizes and orientations, using information language to describe their similarities, differences, parts, and other attributes K.G.5 Model shapes in the world by building shapes from components and drawing shapes		

Progress Indicator: E.GM.1b analyzing and comparing two- (and later) three-dimensional shapes using informal language (e.g., flat, solid, corners) to describe their differences and similarities, as well as their component parts (number of sides, vertices) and other attributes (e.g., sides of equal length)		
Core Content Connectors: 1	CCSS Domain/Cluster	Common Core State Standard
1.GM.1b1 Identify shapes as two-dimensional (lying flat) or three dimensional (solid)	Geometry K G Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres)	K.G.3 Identify shapes as two-dimensional (lying in a plane, “flat”) or three-dimensional (“solid”).
1.GM.1b2 Distinguish two-dimensional shapes based upon their defining attributes (i.e., size, corners, and points)	Geometry 1 G Reason with shapes and their attributes.	1.G.1 Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
Progress Indicator: E.GM.1c composing two-dimensional shapes (rectangles, squares, triangles, half-circles, and quarter-circles)		
Core Content Connectors: 1	CCSS Domain/Cluster	Common Core State Standard
1.GM.1c 2 Compose two- and three-dimensional shapes	Geometry 1 G Reason with shapes and their attributes.	1.G.2 Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.
Progress Indicator: E.GM.1f partitioning shapes into 2, 3, or 4 equal parts and describing the parts (halves, quarters, fourths, thirds)		
Core Content Connectors: 1	CCSS Domain/Cluster	Common Core State Standard
1.GM.1f1 Partition circles and rectangles into two equal parts	Geometry 1 G Reason with shapes and their attributes.	1.G.3 Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases <i>half of</i> , <i>fourth of</i> , and <i>quarter of</i> . Describe the whole as two of or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares
Explanations and clarifications:		

Progress Indicator: E.GM.1a recognizing, describing (using spatial language) and naming shapes regardless of orientation or size and locating shapes in the environment		
Core Content Connectors: 2	CCSS Domain/Cluster	Common Core State Standard
2.GM.1a4 Identify two-dimensional shapes such as rhombus, pentagons, hexagons, octagon, ovals, equilateral, isosceles, and scalene triangles	Geometry 2 G Reason with shapes and their attributes.	2.G.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.
Progress Indicator: E.GM.1b analyzing and comparing two- (and later) three-dimensional shapes using informal language (e.g., flat, solid, corners) to describe their differences and similarities, as well as their component parts (number of sides, vertices) and other attributes (e.g., sides of equal length)		
Core Content Connectors: 2	CCSS Domain/Cluster	Common Core State Standard
2.GM.1b3 Distinguish two- or three- dimensional shapes based upon their attributes (i.e., # of sides, equal or different lengths of sides, # of faces, # of corners)	Geometry 2 G Reason with shapes and their attributes.	2.G.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.
Progress Indicator: E.GM.1d composing three-dimensional shapes, using concrete models/materials (cubes, prisms, cones, and cylinders)		
Core Content Connectors: 2	CCSS Domain/Cluster	Common Core State Standard
2.GM.1d1 Compose three-dimensional shapes	Geometry 1 G Reason with shapes and their attributes.	1.G.2 Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half circles, and quarter circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.
Progress Indicator: E.GM.1e drawing and identifying shapes with specific attributes (e.g., number of sides or equal angles) not determined by direct measuring		
Core Content Connectors: 2	CCSS Domain/Cluster	Common Core State Standard
2.GM.1e1 Draw two-dimensional shapes with specific attributes	Geometry 2 G Reason with shapes and their attributes.	2.G.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.
Progress Indicator: E.GM.1f partitioning shapes into 2, 3, or 4 equal parts and describing the parts (halves, quarters, fourths, thirds)		
Core Content Connectors: 2	CCSS Domain/Cluster	Common Core State Standard
2.GM.1f2 Partition circles and rectangles into 2 and 4 equal parts	Geometry 2 G Reason with shapes and their attributes.	2.G.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words <i>halves, thirds, half of, a third of</i> , 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.
2.GM.1f3 Label a partitioned shape (e.g., one whole rectangle was separated into 2 halves, one whole circle was separated into three thirds)	Geometry 2 G Reason with shapes and their attributes.	2.G.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words <i>halves, thirds, half of, a third of</i> , 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.
Explanations and clarifications: The following Progress Indicator was not included due to complexity, no CCSS are linked to this Progress Indicator: E.GM.1g using spatial language to describe and name more complex or atypical shapes based on their defining characteristics.		

Progress Indicator: E.GM.1h describing, analyzing, comparing, and classifying two-dimensional figures (triangles, quadrilaterals) using shared attributes		
Core Content Connectors: 3	CCSS Domain/Cluster	Common Core State Standard
3.GM.1h1 Identify shared attributes of shapes	Geometry 3 G Reason with shapes and their attributes.	3.G.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having 4 sides) and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals that do not belong to any of these subcategories.
Progress Indicator: E.GM.1i partitioning shapes into equal parts with equal areas and recognizing that each part is a unit fraction of the whole		
Core Content Connectors: 3	CCSS Domain/Cluster	Common Core State Standard
3.GM.1i1 Partition rectangles into equal parts with equal area	Geometry 3 G Reason with shapes and their attributes.	3.G.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. <i>For example, partition a shape into 4 parts with equal area, and describe the area of each part as $\frac{1}{4}$ of the area of the shape.</i>

Explanations and clarifications: CCSS not addressed

Progress Indicator: E.GM.1h describing, analyzing, comparing, and classifying two-dimensional figures (triangles, quadrilaterals) using shared attributes		
Core Content Connectors: 4	CCSS Domain/Cluster	Common Core State Standard
4.GM.1h2 Classify two-dimensional shapes based on attributes (# of angles)	Geometry 4 G Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	4.G.2 Classify two dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right angles as a category, and identify right angles.
Progress Indicator: E.GM.1j recognizing and drawing points, lines, line segments, rays, angles, and perpendicular and parallel lines and identifying these in plane figures		
Core Content Connectors: 4	CCSS Domain/Cluster	Common Core State Standard
4.GM.1j1 Recognize a point, line and line segment, rays in two-dimensional figures	Geometry 4 G Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	4.G.1 Draw points, lines, line segments, rays, angles, perpendicular, and parallel lines. Identify these in two-dimensional figures.
4.GM.1j2 Recognize perpendicular and parallel lines in two-dimensional figures	Geometry 4 G Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	4.G.1 Draw points, lines, line segments, rays, angles, perpendicular, and parallel lines. Identify these in two-dimensional figures.
4.GM.1j3 Recognize an angle in two-dimensional figures	Geometry 4 G Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	4.G.1 Draw points, lines, line segments, rays, angles, perpendicular, and parallel lines. Identify these in two-dimensional figures.
4.GM.1j4 Categorize angles as right, acute, or obtuse	Geometry 4 G Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	4.G.2 Classify two dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right angles as a category, and identify right triangles.
Progress Indicator: E.GM.1k recognizing and drawing lines of symmetry in a variety of figures		
Core Content Connectors: 4	CCSS Domain/Cluster	Common Core State Standard
4.GM.1k1 Recognize a line of symmetry in a figure	Geometry 4 G Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	4.G.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts, identify line-symmetric figures and draw lines of symmetry.

Explanations and clarifications:

Progress Indicator: E.GM.1j recognizing and drawing points, lines, line segments, rays, angles, and perpendicular and parallel lines and identifying these in plane figures		
Core Content Connectors: 5	CCSS Domain/Cluster	Common Core State Standard
5.GM.1j1 Recognize parallel and perpendicular lines within the context of two-dimensional figures	Geometry 4 G Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	4.G.1 Draw points, lines, line segments, rays, angles, perpendicular, and parallel lines. Identify these in two-dimensional figures.
Progress Indicator: M.GM.1a describing and classifying plane figures based on their properties		
Core Content Connectors: 5	CCSS Domain/Cluster	Common Core State Standard
5.GM.1a1 Recognize properties of simple plane figures	Geometry 5 G Classify two-dimensional figures into categories based on their properties.	5.G.3 Understand that attributes belonging to a category of two dimensional figures also belong to all subcategories of that category . <i>For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.</i>
Progress Indicator: M.GM.1b recognizing and using properties belonging to categories and subcategories of plane figures (e.g., all rectangles have four right angles, so all squares are rectangles and have four right angles)		
Core Content Connectors: 5	CCSS Domain/Cluster	Common Core State Standard
5.GM.1b1 Distinguish plane figures by their properties	Geometry 5 G Classify two-dimensional figures into categories based on their properties.	5.G.4 Classify two dimensional figures in a hierarchy based on properties.
Progress Indicator: M.GM.1c demonstrating the use of a coordinate system by locating/graphing a given point or polygon using ordered pairs		
Core Content Connectors: 5	CCSS Domain/Cluster	Common Core State Standard
5.GM.1c1 Locate the x and y axis on a graph	Geometry 5 G Graph points on the coordinate plane to solve real-world and mathematical problems.	5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the – on each line and a given point in the plane located by using an ordered pair of numbers called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of

		the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
5.GM.1c2 Locate points on a graph	Geometry 5 G Graph points on the coordinate plane to solve real-world and mathematical problems.	5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the – on each line and a given point in the plane located by using an ordered pair of numbers called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
5.GM.1c3 Use order pairs to graph given points	Geometry 5 G Graph points on the coordinate plane to solve real-world and mathematical problems.	5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the – on each line and a given point in the plane located by using an ordered pair of numbers called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
Explanations and Clarifications: CCSS not addressed		

Progress Indicator: M.GM.1c demonstrating the use of a coordinate system by locating/graphing a given point or polygon using ordered pairs		
Core Content Connectors: 6	CCSS Domain/Cluster	Common Core State Standard
6.GM.1c4 Locate points on a graph	Geometry 5 G Graph points on the coordinate plane to solve real-world and mathematical problems.	5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the – on each line and a given point in the plane located by using an ordered pair of numbers called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two

		axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
6.GM.1c5 Use order pairs to graph given points	Geometry 5 G Graph points on the coordinate plane to solve real-world and mathematical problems.	5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the – on each line and a given point in the plane located by using an ordered pair of numbers called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
6.GM.1c6 Find coordinate values of points in the context of a situation	Geometry 5 G Graph points on the coordinate plane to solve real-world and mathematical problems.	5.G.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
6.GM.1c7 Use coordinate points to draw polygons	Geometry 6 G Solve real-world and mathematical problems involving area, surface area, and volume.	6.G.3 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.
6.GM.1c8 Use coordinate points to find the side lengths of polygons that are horizontal or vertical	Geometry 6 G Solve real-world and mathematical problems involving area, surface area, and volume.	6.G.3 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.
Progress Indicator: M.GM.1d solving area, surface area, and volume problems by composing and decomposing figures		
Core Content Connectors: 6	CCSS Domain/Cluster	Common Core State Standard
6.GM.1d1 Find area of quadrilaterals	Geometry 6 G Solve real-world and mathematical problems involving area, surface area, and volumes.	6.G.1 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.
6.GM.1d2 Find area of triangles	Geometry 6 G Solve real-world and mathematical problems involving area, surface area, and volumes.	6.G.1 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
Explanations and clarifications:		

Progress Indicator: M.GM.1e constructing or drawing geometric shapes from given conditions (e.g., draw triangles given three angle or side measures; change scale)		
Core Content Connectors: 7	CCSS Domain/Cluster	Common Core State Standard
7.GM.1e1 Construct or draw plane figures using properties	Geometry 7 G Draw, construct, and describe geometrical figures and describe the relationships between them.	7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
Progress Indicator: M.GM.1h solving real-world area, surface area, and volume problems using different strategies (formulas and decomposing figures)		
Core Content Connectors: 7	CCSS Domain/Cluster	Common Core State Standard
7.GM.1h1 Add the area of each face of a prism to find surface area of three-dimensional objects	Geometry 7 G Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	7.G.6 Solve real-world and mathematical problems involving area, volume, and surface area of two and three dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
7.GM.1h2 Find the surface area of three-dimensional figures using nets of rectangles or triangles	Geometry 6 G Solve real-life and mathematical problems involving area, surface area, and volume. 7 G Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	6.G.1 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. 7.G.6 Solve real-world and mathematical problems involving area, volume, and surface area of two and three dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
7.GM.1h3 Find area of plane figures and surface area of solid figures (quadrilaterals)	Geometry 7 G Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	7.G.6 Solve real-world and mathematical problems involving area, volume, and surface area of two and three dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
7.GM.1h4 Find area of an equilateral, isosceles, and scalene triangle	Geometry 7 G Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	7.G.6 Solve real-world and mathematical problems involving area, volume, and surface area of two and three dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

7.GM.1h5 Describe the two-dimensional figures that result from a decomposed three-dimensional figure.	<p style="text-align: center;">Geometry</p> 7 G Draw, construct, and describe geometrical figures and describe the relationships between them.	7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
Explanations and clarifications:		

Progress Indicator: M.GM.1f recognizing and demonstrating rotations, reflections, and translations using multiple contexts (e.g., using coordinates, models, drawings, technology)		
Core Content Connectors: 8	CCSS Domain/Cluster	Common Core State Standard
8.GM.1f1 Recognize a rotation, reflection, or translation of a figure	Geometry 8 G Understand congruence and similarity using physical models, transparencies, or geometry software.	8.G.1 Verify experimentally the properties of rotations, reflections, and translations: a) Lines are taken to lines, and line segments to line segments of the same length. b) Angles are taken to angles of the same measure. c) Parallel lines are taken to parallel lines.
8.GM.1f2 Identify a rotation, reflection, or translation of a plane figure when given coordinates	Geometry 8 G Understand congruence and similarity using physical models, transparencies, or geometry software.	8.G.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
Progress Indicator: M.GM.1g demonstrating congruence and similarity using a variety of two-dimensional figures		
Core Content Connectors: 8	CCSS Domain/Cluster	Common Core State Standard
8.GM.1g1 Recognize congruent and similar figures	Geometry 8 G Understand congruence and similarity using physical models, transparencies, or geometry software.	8.G.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
Progress Indicator: M.GM.1i exploring and explaining angle relationships (e.g., pairs of parallel lines cut by a transversal, including perpendicular lines)		
Core Content Connectors: 8	CCSS Domain/Cluster	Common Core State Standard
8.GM.1i1 Identify supplementary angles	Geometry 7 G Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure.
8.GM.1i2 Identify complimentary angles	Geometry 7 G Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure.
8.GM.1i3 Identify adjacent angles	Geometry 7 G Solve real-life and mathematical problems involving angle measure,	7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure.

	area, surface area, and volume.	
8.GM.1i4 Use angle relationships to find the value of a missing angle	<p style="text-align: center;">Geometry</p> <p>7 G Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</p> <p>8 G Understand congruence and similarity using physical models, transparencies, or geometry software.</p>	<p>7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure.</p> <p>8.G.5 Use informal arguments to establish facts about the angle sum and exterior angle for triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. <i>For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and given an argument in terms of transversals why this is so.</i></p>
Progress Indicator: M.GM.1j applying the Pythagorean Theorem		
Core Content Connectors: 8	CCSS Domain/Cluster	Common Core State Standard
8.GM.1j1 Find the hypotenuse of a two-dimensional right triangle (Pythagorean Theorem)	<p style="text-align: center;">Geometry</p> <p>8 G Understand and apply the Pythagorean Theorem.</p>	8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
8.GM.1j2 Find the missing side lengths of a two-dimensional right triangle (Pythagorean Theorem)	<p style="text-align: center;">Geometry</p> <p>8 G Understand and apply the Pythagorean Theorem.</p>	8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
Explanations and clarifications:		

Progress Indicator: H.GM.1a applying the Pythagorean Theorem		
Core Content Connectors: 9-12	CCSS Domain/Cluster	Common Core State Standard
H.GM.1a1 Find the hypotenuse of a two-dimensional right triangle (Pythagorean Theorem)	<p style="text-align: center;">Geometry</p> <p>8 G Understand and apply the Pythagorean Theorem.</p>	8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
H.GM.1a2 Find the missing side lengths of a two-dimensional right triangle (Pythagorean Theorem)	<p style="text-align: center;">Geometry</p> <p>8 G Understand and apply the Pythagorean Theorem.</p>	8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

Progress Indicator: H.GM.1b using congruence and similarity relationships to solve problems, including triangle congruence relationships		
Core Content Connectors: 9-12	CCSS Domain/Cluster	Common Core State Standard
H.GM.1b1 Use definitions to demonstrate congruency and similarity in figures	<p style="text-align: center;">Congruence</p> <p>G.CO Understand congruence in terms of rigid motions.</p> <p style="text-align: center;">Similarity, Right Triangles, and Trigonometry</p> <p>G.SRT Understand similarity in terms of similarity transformations.</p>	<p>G.CO.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.</p> <p>G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.</p>
Progress Indicator: H.GM.1c applying understanding of rotations, reflections, and translations to construct figures (e.g., using coordinates, models, drawings, transparencies, dynamic geometry software)		
Core Content Connectors: 9-12	CCSS Domain/Cluster	Common Core State Standard
H.GM.1c1 Construct, draw or recognize a figure after its rotation, reflection, or translation	<p style="text-align: center;">Congruence</p> <p>G.CO Experiment with transformations in the plane.</p>	<p>G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure. Specify a sequence of transformation that will carry a given figure onto another.</p> <p>G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry onto itself.</p>
Progress Indicator: H.GM.1d applying scale factors in solving multiple similarity problems, including transformations in the coordinate plane and similarity relationships with right triangles		
Core Content Connectors: 9-12	CCSS Domain/Cluster	Common Core State Standard
H.GM.1d1 Use the reflections, rotations, or translations in the coordinate plane to solve problems with right angles	<p style="text-align: center;">Geometry</p> <p>8.G Understand congruence and similarity using physical models, transparencies, or geometry software.</p> <p style="text-align: center;">Similarity, Right Triangles, and Trigonometry</p> <p>G.SRT Understand similarity in terms of similarity transformations.</p>	<p>8.G.1 Verify experimentally the properties of rotations, reflections, and translations</p> <ul style="list-style-type: none"> a) Lines are taken to lines, and line segments to line segments of the same length. b) Angles are taken to angles of the same measure. c) Parallel lines are taken to parallel lines. <p>G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformation the meaning of similarity for triangles and the equality of all corresponding pairs and angles and the proportionality of all corresponding pairs of</p>

		sides.
Progress Indicator: H.GM.1e making various geometric constructions, including use of dynamic geometry software, and creating informal proofs of relationships (lines and angles, circles, polygons)		
Core Content Connectors: 9-12	CCSS Domain/Cluster	Common Core State Standard
H.GM.1e1 Make formal geometric constructions with a variety of tools and methods	Congruence G CO Make Geometric constructions.	G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straight edge, string, reflective devices, paper folding dynamic geometric software, etc.) Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.
Explanations and clarifications: High school standards not addressed; will be in a separate document		