	Geometric Shapes	**Composing & Decomposing Geometric Shapes**	**Spatial Relations & Structuring**
	In learning about shapes, it's important to vary the examples in many ways so that students do not learn limited concepts that they must later unlearn. From K on, students experience all of the properties of shapes that they will study in K-7, working with these properties in increasingly sophisticated ways.		

K	• Recognize straight and curved lines
	• Recognize closed and open shapes
	• Analyze and compare 2 and 3-D shapes in different sizes and orientations
	• Use informal language to describe and compare 2D and 3D shapes:
	  ○ Similarities
	  ○ Differences
	  ○ parts (# of sides and vertices/corners for 2-D and identify faces of 3-D shapes as 2-D geometric figures)
	  ○ other attributes (ie: having sides of equal length
	• Naming 2-D and 3-D shapes increasingly becomes more sophisticated with exposure
	• Sort and explain their classifications of shapes in their own words
	• Identify shapes as 2-D (flat) and 3-D (solid)
		• Drawing shapes (freehand, by connecting dots, geoboards, software, etc. and building with components (straws, sticks, etc)
		• Combine 2-D shapes to build pictures, designs, and solve probs. such as puzzles
		• Stack 3-D shapes and create structures out of 3-D shapes
			• Discuss not only shape and orientation , but also the relative positions of objects such as:
			  ○ Above
			  ○ Below
			  ○ Next to
			  ○ Behind
			  ○ In front of
			  ○ Beside
			• Stack 3-D shapes and create structures out of 3-D shapes (spatial recognition/recreating a model)
			• Identify shapes in the real world such as outside and in the classroom

1	• Describe and classify shapes in terms of their geometric attributes including:
	  ○ Drawings
	  ○ Manipulatives
	  ○ Physical-world objects
	• Distinguish between defining (5 sides) and non-defining attributes (color)
	• Build and draw examples/non-examples of shape categories
		• Compose and decompose plane and solid figures building understanding of the part-part-whole relationship and properties of the original and composite shapes
		• Perceive a combination of shapes as a single new shape
		• They learn to substitute 1 composite shape for another congruent composite composed of different parts (ie: hexagon- 6 triangles or 1 trapezoid and 3 triangles)
		• Students relate geometric figures to equal parts and name the parts as halves, fourths or quarters
		• Explore that as shapes are partitioned to create more shapes (wholes to halves, halves to fourths), those parts get smaller
			• Use 3-D figures to create more complex structures such as arches, stairways, etc.

2	• Moving towards more specific vocabulary:
	  ○ Side for 2-D; edge for 3-D instead of saying line
	  ○ Vertex instead of corner
		• Develop foundations for area, fractions, and proportions:
		  ○ Partition circles, rectangles, and squares into two, three, or four equal parts (shares)
			• Conceptually structure an array (rows and columns) to understand 2-D regions as truly 2-D
			• Partition a rectangle into rows and columns of same-size squares

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	• Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. • Identify and recognize regular polygons (equal sides): triangles, quadrilaterals, pentagons, hexagons, octagons and cubes. • Sort different polygons by the number of sides/vertices. • Identify differences among shapes.	○ Recognize that equal shares of identical wholes need not have the same shape. ○ Describe the equal shares using appropriate vocabulary: *halves, thirds, fourths, quarters, half of, a third of, a fourth of, a quarter of* ○ Describe the whole in terms of its partitioned parts e.g. if a circle is partitioned into four equal parts, each part it one fourth of the whole, and four fourths equals the whole	• Tell how the shape was partitioned into squares and count to find the total number of them.
3	• Classify shapes (specifically quadrilaterals including rhombus, square, rectangle, parallelogram and trapezoid) into categories and subcategories (kites may be seen as an example of a quadrilateral, but will not need to be specifically named) • Students should be able to recognize the following attributes in shapes: ○ Number of sides ○ Number of angles ○ Right angles ○ Sides have same length ○ Sides are straight lines ○ NOT parallel or perpendicular • Draw examples/nonexamples of shapes in subcategories	• Partition shapes into 2,3,4,6,8 equal parts; shapes may include quads, equilateral triangle, isosceles triangle, regular hexagon, regular octagon and a circles. • Identify each part as a unit fraction	
4	• Understand that lines are infinite in extent and points have a location but no dimension • Draw points, lines, line segments, angles, perpendicular and parallel lines and recognize them in shapes • Draw shapes given multiple attributes • Analyze, compare, and classify 2-D shapes by their properties now including angle sizes, perpendicular, and parallel lines • Classify triangles as equilateral, equiangular, isosceles, or scalene by using side length • Classify triangles as acute, right, or obtuse by using angle size		• Represent angles as two rays, including the reference line • Understand that the size of an angle as a rotation of a ray on the reference line to a line depicting slope (**see Measurement progressions for additional understanding with angle measure**) • Recognize line of symmetry; identify line-symmetric figures and draw lines of symmetry

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	• Cross-Classify triangles e.g. right isosceles • Classify quadrilaterals and other polygons including parallelograms, rectangles, squares, rhombuses, and trapezoid (using both inclusive and exclusive definitions)		
5	• Sort and classify 2-D figures in a hierarchy based on properties • Use graphic organizers (including a Venn Diagram) to compare and contrast the attributes of shapes (including polygons, triangles, and quadrilaterals) • Understand attributes belonging to a category of 2-D figures also belong to all subcategories (understand trapezoids could include both the inclusive and exclusive definitions)	• Highly developed ability to compose and decompose shapes to solve area and volume problems	• Spatial structuring of rectangular arrays; foundation for mult., area, volume, and coordinate planes • Informally extend spatial structuring in 2 ways: ○ In 3 dimensions (used to find the volume) ○ Coordinate planes in understanding the continuous nature of 2-D space and role of whole numbers in specifying locations in that space. (quadrant I) (**see Algebraic Progressions**)