Examples of Standards for Mathematical Practice 7 and 8 Found in the Progressions Documents

Examples of SMP 7 Found in the Progressions Documents

(Please note: These are not the only references in the progressions.)

	Geometry
Kindergarten	In the domain of shape, students learn to match two-dimensional shapes even when the shapes have different orientations. (K.G.4) They learn to name shapes such as circles, triangles, and squares, whose names occur in everyday language, and distinguish them from non-examples of these categories, often based initially on visual prototypes. Exemplars are the typical visual prototypes of the shape category. Variants are other examples of the shape category. Palpable distractors are non-examples with little or no overall resemblance to the exemplars. Difficult distractors are visually similar to examples but lack at least one defining attribute. For example, they can distinguish the most typical examples of triangles from the obvious non-examples. From experiences with varied examples of these shapes, students extend their initial intuitions to increasingly comprehensive and accurate intuitive concept images of each shape category. These richer concept images support students' ability to perceive a variety of shapes in their environments and describe these shapes in their own words. (MP7) This includes recognizing and informally naming three-dimensional shapes, e.g., "balls," "boxes," "cans." Such learning might also occur in the context of solving problems that arise in construction of block buildings and in drawing pictures, simple maps, and so forth. They learn to sort shapes according to these categories. (MP7) Young students, for example, . . . may sort a collection of shapes according to how many sides the shapes have.
Grade 1	…based on early work recognizing, naming, sorting, and building shapes from components, they describe in their own words why a shape belongs to a given category, such as squares, triangles, circles, rectangles, rhombuses, (regular) hexagons, and trapezoids (with bases of different lengths and nonparallel sides of the same length). In doing so, they differentiate between geometrically defining attributes (e.g., "hexagons have six straight sides") and non-defining attributes (e.g., color, overall size, or orientation). (1.G.1) For example, they might say of this shape, "This has to go with the squares, because all four sides are the same, and these are square corners. It doesn't matter which way it's turned" (MP3, MP7). They explain why the variants shown earlier (p. 6) are members of familiar shape categories and why the difficult distractors are not, and they draw examples and non-examples of the shape categories. Students learn to sort shapes accurately and exhaustively based on these attributes, describing the similarities and differences of these familiar shapes and shape categories (MP7, MP8).
Grade 2	Another type of composition and decomposition is essential to students' mathematical development—spatial structuring. Students need to conceptually structure an array to understand two-dimensional regions as truly two-dimensional. This involves more learning than is sometimes assumed. Students need to understand how a rectangle can be tiled with squares lined up in rows and columns. (2.G.2) At the lowest level of thinking, students draw or place shapes inside the rectangle, but do not cover the entire region. Only at the later levels do all the squares align vertically and horizontally, as the students learn to compose this two-dimensional shape as a collection of rows of squares and as a collection of columns of squares (MP7).
Grade 3	Students investigate, describe, and reason about decomposing and composing polygons to make other polygons. Problems such as finding all the possible different compositions of a set of shapes involve geometric problem solving and notions of congruence and symmetry (MP7).
Grade 5	By the end of Grade 5, competencies in shape composition and decomposition, and especially the special case of spatial structuring of rectangular arrays, should be highly developed (MP7). Students need to develop these competencies because they form a foundation for understanding multiplication, area, volume, and the coordinate plane. To solve area problems, for example, the ability to decompose and compose shapes plays multiple roles. First, students understand that the area of a shape (in square units) is the number of unit squares it takes to cover the shape without gaps or overlaps. They also use decomposition in other ways. For example, to calculate the area of an "L-shaped" region, students might decompose the region into rectangular regions, then decompose each region into an array of unit squares, spatially structuring each array into rows or columns.

Examples of SMP 8 Found in the Progressions Documents

(Please note: These are not the only references in the progressions.)

	Geometry
Grade 1	…based on early work recognizing, naming, sorting, and building shapes from components, they describe in their own words why a shape belongs to a given category, such as squares, triangles, circles, rectangles, rhombuses, (regular) hexagons, and trapezoids (with bases of different lengths and nonparallel sides of the same length). In doing so, they differentiate between geometrically defining attributes (e.g., "hexagons have six straight sides") and non-defining attributes (e.g., color, overall size, or orientation). (1.G.1) For example, they might say of this shape, "This has to go with the squares, because all four sides are the same, and these are square corners. It doesn't matter which way it's turned" (MP3, MP7). They explain why the variants shown earlier (p. 6) are members of familiar shape categories and why the difficult distractors are not, and they draw examples and non-examples of the shape categories. Students learn to sort shapes accurately and exhaustively based on these attributes, describing the similarities and differences of these familiar shapes and shape categories (MP7, MP8).