



## Topic A:

# Definitions and Properties of the Basic Rigid Motions

## 8.G.A.1

<b>Focus Standard:</b>	8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations: <ol style="list-style-type: none"> <li>Lines are taken to lines, and line segments to line segments of the same length.</li> <li>Angles are taken to angles of the same measure.</li> <li>Parallel lines are taken to parallel lines.</li> </ol>
<b>Instructional Days:</b>	6	
<b>Lesson 1:</b>	Why Move Things Around? (E) <sup>1</sup>	
<b>Lesson 2:</b>	Definition of Translation and Three Basic Properties (P)	
<b>Lesson 3:</b>	Translating Lines (S)	
<b>Lesson 4:</b>	Definition of Reflection and Basic Properties (P)	
<b>Lesson 5:</b>	Definition of Rotation and Basic Properties (S)	
<b>Lesson 6:</b>	Rotations of 180 Degrees (P)	

In Topic A, students learn about the *mathematical* needs for rigid motions and begin by exploring the *possible* effects of rigid motions in Lesson 1. In particular, the study of rigid motions in this module will not just be about moving geometric figures around by the use of reflections, translations, and rotations. Rather, students explore the geometric implications of having an abundance of these basic rigid motions in the plane. Lessons on translation, reflection, and rotation show students that lines are taken to lines, line segments are taken to line segments, and parallel lines are taken to parallel lines. In addition to the intuitive notion of figures “retaining the same shape” under such motions, students learn to express precisely the fact that lengths of segments and size of angles are preserved.

Lessons 2 and 3 focus on translation but also set up precise definitions and statements related to transformations that are used throughout the remainder of the module. In Lesson 2, students learn the basics of translation by translating points, lines, and figures along a vector, and students verify experimentally that translations map lines to lines, segments to segments, rays to rays, and angles to angles. Students also

<sup>1</sup> Lesson Structure Key: P-Problem Set Lesson, M-Modeling Cycle Lesson, E-Exploration Lesson, S-Socratic Lesson

verify experimentally that translations preserve length and angle measure. Lesson 3 focuses on the translation of lines, specifically the idea that a translation maps a line either to itself or to a parallel line.

In Lesson 4, students verify experimentally that reflections are distance and degree-preserving. In Lesson 5, rotation around a point is investigated in a similar manner as the other rigid motions. Students verify experimentally that rotations take lines to lines, etc. and are distance and degree-preserving. In Lesson 6, students are provided proof that 180-degree rotations map a line to a parallel line and use that knowledge to prove that vertical angles are equal.