BUTTERFLIES, PINWHEELS, AND WALLPAPER   Symmetry and Transformations

Instructional Time and Investigations	24 days	• Inv. 1: Symmetry and Transformations (4 Problems) • Inv. 2: Transformations and Congruence (3 Problems) • Inv. 3: Transforming Coordinates (5 Problems) • Inv. 4: Dilations and Similar Figures (4 Problems)
Goals	**Transformations:** Describe types of transformations that relate points by the motions of reflections, rotations, and translations; and describe methods for identifying and creating symmetric plane figures. • Various transformations affect distances and angles of figures differently. These effects help you compare figures and determine the similarity or congruence between figures.	**Congruence and Similarity:** Understand congruence and similarity and explore necessary and sufficient conditions for establishing congruent and similar shapes. • Two shapes are congruent if a specific sequence of rigid transformations will transform one shape to the other. Two figures are similar if a specific sequence of rigid transformations and dilation will transform one shape to the other. • Properties of transformations, congruence, and similarity can be used to solve problems about shapes and measurements.
Common Core Standards	**Common Core Standards for Mathematical Practice** **MP.1:** Make sense of problems and persevere in solving them. **MP.2:** Reason abstractly and quantitatively. **MP.3:** Construct viable arguments and critique the reasoning of others. **MP.4:** Model with mathematics. **MP.5:** Use appropriate tools strategically. **MP.6:** Attend to precision. **MP.7:** Look for and make use of structure. **MP.8:** Look for and express regularity in repeated reasoning.	**Common Core Content Standards** **8.G.A.1:** Verify experimentally the properties of rotations, reflections, and translations. **8.G.A.2:** Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. **8.G.A.3:** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. **8.G.A.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. **Also: 8.EE.B.6, 8.G.A.1a–c, 8.G.A.5**

BUTTERFLIES, PINWHEELS, AND WALLPAPER Symmetry and Transformations		
Content Connections to Other Units		
Goals of the Unit	**Prior Work**	**Future Work**
Transformations: Describe types of transformations that relate points by the motions of reflections, rotations, and translations; and describe methods for identifying and creating symmetric plane figures.	• Recognizing and completing mirror reflections (*Shapes and Designs*) • Recognizing and completing designs with rotation symmetry (*Shapes and Designs*) • Recognizing, analyzing, and producing tessellations (*Shapes and Designs; Stretching and Shrinking*)	• Recognizing symmetry in graphs of functions (*Say It With Symbols; Function Junction; High School*) • Applying the ideas of symmetry to other subjects, such as graphic design and architecture (*High School*)
Congruence and Similarity: Understand congruence and similarity and explore necessary and sufficient conditions for establishing congruent and similar shapes.	• Looking for regularity and using patterns to make predictions (*all Connected Mathematics Units*) • Relating similarity transformations to the concept of similarity (*Stretching and Shrinking*) • Performing and analyzing similarity transformations (*Stretching and Shrinking*) • Describing similarity transformations in words and with coordinate rules (*Stretching and Shrinking*) • Reasoning about angles formed by parallel lines and transversals (*Shapes and Designs*)	• Making inferences and predictions based on observation, and proving predictions (*High School*) • Describing symmetry in graphs, such as graphs of quadratic functions, periodic functions, and power functions (*Say It With Symbols; Frogs, Fleas, and Painted Cubes; Function Junction; High School*) • Reasoning about congruence theorems in geometry (*High School*) • Finding equations for similar and congruent circles (*High School*) • Using matrices to represent transformations (*High School*) • Proving theorems about lines and angles (*High School*)