Subject: Math Grade: 8 Unit #: 5 Title: Butterflies, Pinwheels, and Wallpaper

UNIT OVERVIEW

STAGE ONE: Identify Desired Results

Established Goals/Standards

8.G.1 a,b,c
8.G.2
8.G.3
8.G.5

Long-Term Transfer Goal

At the end of this unit, students will use what they have learned to independently…
To develop their understanding of congruence and similarity of geometric figures and the mathematical techniques for finding and applying those relationships of shapes. The basic idea of congruence is that two figures have the same shape and size if it is possible to perform one or more transformations that "move" one figure onto the other. The basic idea of similarity is that two figures have the same shape if it is possible to perform dilation or one or more ridged motions to transform one figure onto the other.

Meaning

Enduring Understandings
Students will understand that…
To create and understating useful designs, it is helpful to know ways of making and describing shapes. In this unit, students will understand geometric shapes in terms of symmetry, transformations, congruence and similarity.

(Transformations)
- Recognize properties of reflection, rotations, and translation transformations
- Explore techniques for using rigid motion transformation to create symmetric designs
- use coordinate rules for basic rigid motion transformations

(Congruence and Similarity)
- recognize that two figures are congruent if one is derived from the other by a sequence of reflection, rotation, and/or translation transformations
- recognize that two figures are similar if one can be obtained from the other by a sequence of reflections, rotations, translations, and/or dilations
- use transformations to describe a sequence that exhibits the congruence figures
- use transformations to explore minimum measurements conditions for establishing congruence of triangles
- relate properties of angles formed by

Essential Questions
Students will consider such questions as…

How can transformations be used to understand congruence and similarity of geometric shapes?

		parallel lines and transversals, and the angle sum in any triangles, to properties of transformations • use properties of congruent figures and similar triangles to solve problems about shapes and measurements	
		Acquisition	
		What knowledge will students learn as part of this unit? How can you use symmetry to describe the shape and properties of figures in a design or a problem? What figures in a pattern are congruent? What parts of congruent figure will be matched by a congruence transformation? What figures in a problem are similar?	*What skills will students learn as part of this unit?* • Identify figures that have different kinds of symmetry • Describe types of symmetry using reflections, rotations, and translations • Use symmetry transformations to compare the size and shape of figures to see whether they are congruent or similar

STAGE TWO: Determine Acceptable Evidence	
	Assessment Evidence
Criteria for to assess understanding: *(This is used to build the scoring tool.)*	Performance Task focused on Transfer: Unit test
	Other Assessment Evidence: • Check ups • Partner Quiz (post investigation 2) • Self-assessments of learning targets • Teacher observations • Unit Test • Common assessment (task to be determined at 25 weeks)

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T, M, A *(Code for Transfer, Meaning Making and Acquisition)*	**STAGE THREE: Plan Learning Experiences**	
	Learning Events: Investigation 1: Symmetry and Transformations (6-7 days) In this investigation, scholars will explore rigid motion transformations, or transformations that preserve shape. Scholars will review their understanding of mirror or line symmetry and develop the definition of line reflection transformations. They will learn to test for and create such symmetries. Next, they will access their prior knowledge of rotational symmetry and develop the definition of rotation transformations. They will then develop the idea of translations and translational symmetry. In the last problem, they will summarize basic properties of shapes that are preserved by rigid motion transformations. • Problem 1.1: Butterfly symmetry- Line Reflections (A) • Problem 1.2: In a spin-Rotations (A) • Problem 1.3: Sliding around-Translations (M) • Problem 1.4: Properties of Transformations (M) Investigation 2: Transformations and Congruence (4-5 days) Scholars will begin with an introduction on the concept that figures with the same size and shape can be matched in a way that shows corresponding sides, angles, and vertices. Next they will develop their understanding of the ways in which the congruence of two triangles can be confirmed by transforming one onto the other. Lastly, they will develop the idea that the congruence of triangles can be determined without any transformation and instead by matching the measures of three chosen parts of each triangle. • Problem 2.1: Connecting congruent polygons (A) • Problem 2.2: Supporting the world-congruent triangles I (A) • Problem 2.3: Minimum Measurement- congruent triangles II (M) *Might be supplemented with other material* Investigation 3: Transforming Coordinates (5-6 days) Scholars will explore the special effect of translations and half-turns by having them study a diagram that shows images of a pentagon those two transformations. • Problem 3.1: Flipping on a grid- coordinate rules for reflections (A) • Problem 3.2: Sliding on the grid-coordinate rules for translations (A) • Problem 3.3: Spinning on a grid-coordinate rules for rotations (A) • Problem 3.4: A special property of translations and half-turns (M) • Problem 3.5: Parallel lines, transversals, and angle sums	Evidence of learning: *(formative assessment)* • Reflection questions • Ace questions • Class work • Student journals • Teacher observations