Unit Title: "Stretching and Shrinking"

Course: Middle School Mathematics

Subject Area: Mathematics

Time Frame: 20 days

Standards

Middle School Mathematics Standards	**Sunshine State Standards Benchmarks**	**NCEE New Standards**
The student will: 10.1 Identify similar figures visually and by comparing sides and angles. 10.2 Recognize that lengths between similar figures change by a constant scale factor. 10.3 Build larger, similar shapes from copies of a basic shape. 10.4 Divide a shape into smaller, similar shapes. 10.5 Describe the relationship between similarity and equivalent fractions. 10.6 Describe the effect of scale factor on length ratios and area ratios. 10.7 Determine and use scale factors to find unknown lengths. 10.8 Use the concept of similarity to solve real-world problems. 10.9 Use geometry software to explore similarity transformations. 10.10 Make connections between algebra and geometry.	MA.B.1.3.4 The student constructs, interprets, and uses scale drawings such as those based on number lines and maps to solve real-world problems. *Expectations* The student: • Knows an appropriate scale needed to produce a proportional drawing or model. • Knows proportional relationships used in scale drawings. • Produces a scale drawing. MA.B.2.3.1 The student uses direct (measured) and indirect (not measured) measures to compare a given characteristic in either metric or customary units. *Expectations* The student: • Measures length, weight or mass, and	The student: M2b Identifies similar and congruent shapes and uses transformations in the coordinate plane, i.e., translations, rotations, and reflections. M2e Recognizes similarity and rotational bilateral symmetry in two- and three-dimensional figures. M2k Models situations geometrically to formulate and solve problems. M7c Uses mathematical language to make complex situations easier to understand.

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	capacity or volume using customary or metric units. • Knows relationships between metric units of mass and capacity. • Find measures of length weight or mass, and capacity or volume using proportional relationships and properties of similar geometric figures. MA.C.2.3.1 The student understands the geometric concepts of symmetry, reflection, congruency, similarity, perpendicularity, parallelism, and transformations, including flips, slides, and enlargements. *Expectations* The student: • Uses manipulatives and drawing to solve problems requiring spatial visualization. • Describes and applies the property of parallelism, perpendicularity, and symmetry in real-world context. • Recognizes, draws, and describes congruent and similar figures. • Creates and describes the attributes of a figure either congruent or similar to a given figure. • Identifies and performs the various transformations (reflection, translation, rotation) of a given figure on a coordinate plane.	

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	MA.C.3.3.1 The student represents and applies geometric properties and relationships to solve real-world and mathematical problems. *Expectations* The student: • Observes, explains, and makes conjectures regarding geometric properties and relationships (among angles, lines, regular and irregular polygons.) • Creates and solves angle measurement problems for triangles. • Demonstrates the Pythagorean relationship in right triangles using models or diagrams. • Given two sides of a right triangle, uses the Pythagorean Theorem to find the length of the third side.	

Desired Results

Enduring Understanding	Essential Questions	Knowledge and Skills
Students will understand • The lengths between similar figures change by a constant scale factor. • The relationship between similarity and equivalent fractions. • The effect of scale factor on length ratios and area ratios • Scale factors may be determined and used for finding unknown lengths • The use of similarity concepts in solving real-world problems • The connection between algebra and geometry	• In similar figures, what is exactly the same? What is different? How is it different? • How can we find a way to describe the sizes of two similar figures? • When figures are similar, what relationship can we find in their areas? In their perimeters? • Where can we apply similarity concepts in the everyday world? • Can the coordinate system help us understand similarity? To understand ratios? • How do ideas of stretching and shrinking tie algebra and geometry together?	Students will know • Key terms (e.g., compare, corresponds, corresponding, image, ratio, scale, scale factor, similar transform, transformation, image) Students will be able to • Identify similar figures by comparing sides and angles. • Recognize that lengths between similar figures change by a constant scale factor. • Recognize the relationship between similarity and equivalent fractions. • Understand the effect of scale factor on length ratios and area ratios. • Determine and use scale factors to find unknown lengths. • Use concepts of similarity to solve real-world problems.

Acceptable Evidence

Performance Tasks	Quizzes, Test, and Work Samples	Observations and Dialogues
• **Enlarging Figures** Students use their intuition about enlargements to answer questions about how simple figures grow. Students make drawings of similar figures by using a pair of rubber bands, then compare side lengths, perimeters, and areas of the original and enlarged figures.	Check-Up 1 Quiz A Check-Up 2 Quiz B Unit Test Unit Project – All Similar Shapes	Teacher observations of students during work on performance tasks. Accountable talk during work on performance tasks.

Performance Tasks	Quizzes, Test, and Work Samples	Observations and Dialogues
• **Similar Figures** Using the coordinate system, students draw geometric figures, some similar to one another and others that are distorted. Students explore algebraic rules that cause images to change size and move about the coordinate plane. They compare angle measures and lengths of corresponding sides informally. Students find that for two figures to be similar, corresponding angles must be congruent and corresponding sides must grow by the same factor. • **Patterns of Similar Figures** Students explore what it takes for figures to be similar and discover how triangles are special. Mental images are built to support students' evolving ideas about the relationship between scale factor and area. • **Using Similarity** Students discover the usefulness of their knowledge of similarity and scale factors by solving real-world problems. Problems focus on the concept of similar rectangles, and the importance of determining the scale factor. • **Similar Triangles** Students apply their knowledge about similarity of triangles to real-world problems. • **Stretching and Shrinking with a Computer** Students us the Logo programming language to investigate the effects of changes in scale.		