Dear Family,

The next Unit in your child's mathematics class this year is ***Stretching and Shrinking: Understanding Similarity.*** Its focus is geometry. It teaches students to understand and use the idea of similarity. Students explore what it means for shapes to be mathematically similar.

Unit Goals

In this Unit, students will find relationships among figures that have been stretched or shrunk. They will analyze the resulting changes in properties of the figures, such as area and perimeter. Similarity will also be used to find the heights of real objects (such as buildings and flagpoles).

The Problems are designed to help students begin to reason proportionally. By the end of this Unit, your child will know how to create similar figures, how to determine whether or not two figures are similar, and how to predict the ratios of the lengths and areas of two similar figures. The next Unit develops proportional ideas in numerical contexts.

Helping With Homework and Having Conversations About the Mathematics

In your child's notebook, you can find worked-out examples from problems he or she has done in class, notes on the mathematics of the Unit, and descriptions of the vocabulary words.

You can help with homework and encourage sound mathematical habits as your child studies this Unit by asking questions such as the following:

- *How does the everyday use of the word "similar" differ from its mathematical meaning?*
- *When two figures are similar, what is the same in each figure? What is different in each figure?*
- *When figures are similar, what is the relationship between their areas? Their perimeters?*
- *In what ways can we apply ideas about similarity to solve problems in the everyday world?*

You can help your child with his or her work for this Unit in several ways:

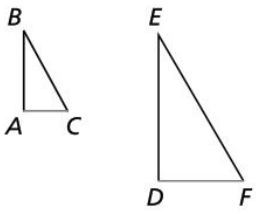
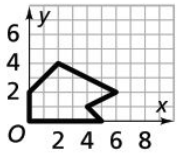
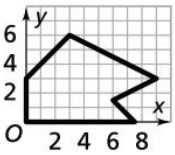
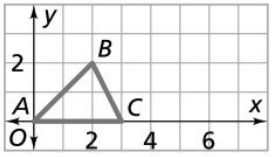
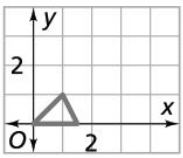
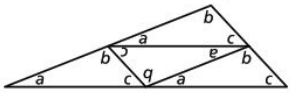
- *Talk with your child about situations that are like those in this Unit – real-world examples of items that are reduced or enlarged, such as models.*
- *Continue to have your child share his or her mathematics notebook with you, showing you the different ideas about similarity that have been recorded.*
- *Share any ways that reductions or enlargements help you in your work or hobbies.*
- *Look over your child's homework; make sure that all questions are answered and all explanations are clear.*

Common Core State Standards

Students develop and use all of the Standards of Mathematical Practice throughout the curriculum. In this Unit, students practice constructing viable arguments and critiquing the reasoning of others as they make conjectures about the similarity of figures and justify their responses to others. This Unit focuses on the Geometry, Ratios & Proportional Relationships, and Expressions & Equations domains in the Common Core State Standards.

A few important mathematical ideas that your child will learn in *Stretching and Shrinking* are given on the next page. As always, if you have any questions or concerns about this Unit or your child's progress in the class, please feel free to call. We are interested in your child and want this year's mathematics experiences to be enjoyable and to promote a firm understanding of mathematics.

Sincerely,

Important Concepts	Examples
Corresponding Corresponding sides or angles have the same relative position in similar figures.	 **Corresponding Sides** *AC* and *DF* *AB* and *DE* *BC* and *EF* **Corresponding angles** *A* and *D* *B* and *E* *C* and *F*
Similarity Two figures are similar if: (1) the measures of their **corresponding** angles are equal and (2) the lengths of their **corresponding** sides increase by the same factor, called the **scale factor**.	The two figures at the right are similar. The corresponding angle measures are equal. The side lengths in Figure B are 1.5 times as long as those in Figure A. So, the scale factor from Figure A to Figure B is 1.5. (Figure A stretches or is enlarged by a factor of 1.5, resulting in Figure B.)  **Figure A**  **Figure B** We also say that the scale factor from Figure B to Figure A is $\frac{1}{1.5}$ or $\frac{2}{3}$. (Figure B shrinks by a factor of $\frac{2}{3}$, resulting in figure A.)
Scale Factor The number used to multiply the lengths of a figure to stretch or shrink it into a similar image. A scale factor larger than 1 will enlarge a figure. A scale factor between 0 and 1 will reduce a figure. The scale factor of two similar figures is given by a ratio that compares the corresponding sides: $\frac{\text{length of a side on the image}}{\text{length of a side on the original}}$	If we use a scale factor of $\frac{1}{2}$, all lengths in the image are $\frac{1}{2}$ as long as the corresponding lengths in the original. The base of the original triangle is 3 units. The base of the image is 1.5 units.   The scale factor is $\frac{1.5}{3}=\frac{3}{6}=\frac{1}{2}$.
Area and Scale Factor Lengths of similar figures will stretch (or shrink) by a scale factor. Areas of the figures will not change in the same way.	Applying a scale factor of 2 to a figure increases the area by a factor of 4.  **Original**  **four copies** Applying a scale factor of 3 to a figure, increases the area by a factor of 9. The original area is 6 cm^2. The area of the image is 9 times as large (54 cm^2).