Dear Family,

In *Stretching and Shrinking*, students use multiplicative reasoning and ratios to create and analyze scale drawings. These scale drawings are similar to the original. CMP always aims to provide opportunities for students to make connections and build meaning. *Stretching and Shrinking* connects back to *Comparing Quantities* in 6th grade and prepares students for an 8th Grade unit on Transformations

UNIT GOALS for *Stretching and Shrinking*
Your child will learn the mathematical meaning of similarity, explore the properties of scaled drawings or similar figures, and use this to solve problems. Your student will learn how to:

- Identify similar figures (scaled figures) by comparing corresponding sides and angles
- Use scale factors and ratios to describe relationships among the side lengths, perimeters, and areas of similar figures
- Construct scale drawings using informal methods, scale factors, and geometric tools
- Use algebraic rules to produce shapes and recognize when a rule shrinks or enlarges a shape
- Use the properties of similarity to find distances and heights that cannot be measured directly
- Use scale factors or ratios to find missing side lengths in a pair of similar figures

The Problems are designed to help students 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 will develop proportional ideas in numerical contexts.

Note: In this unit we will use scale drawings and similar figures interchangeably. In the 8th grade unit *Flip, Spin, Slide, and Stretch*, we will use our understanding of similar figures to explore what happens to similar figures as they undergo transformations.

Homework and Having Conversations about the Mathematics:
To help with homework and encourage sound mathematical habits you can questions such as:

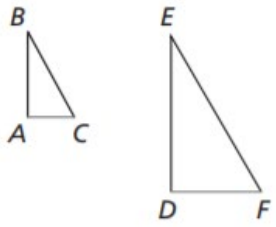
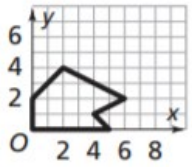
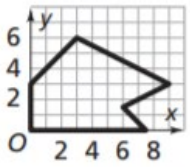
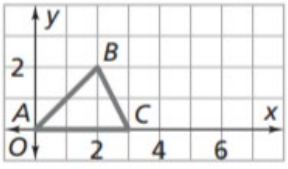
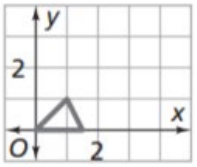
- What determines whether two shapes are similar?
- What is the same and what is different about two similar figures?
- When figures are similar, how are the side lengths, areas, and scale factors related?
- How can I use similar figures to find missing measurements?
- Talk with your child about situations 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.
- Look over your child's homework; make sure that all questions are answered and all explanations are clear.

COMMON CORE STATE STANDARDS (CCSS)
Students develop and use all of the Standards of Mathematical Practice throughout the curriculum. In *Stretching and Shrinking*, students spend significant time creating viable arguments and critiquing the reasoning of others as they make conjectures and justify their

responses to others. The Unit focuses on the Ratios and Proportional Relationships, Expressions and Equations, and Geometry domains in the Common Core State Standards.

A few important mathematical ideas from *Stretching and Shrinking* are on the next page. As always, if you have any questions or concerns, please feel free to contact me.

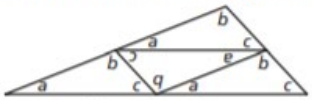
Sincerely,

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.) 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.)  **Figure A**  **Figure B**
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.

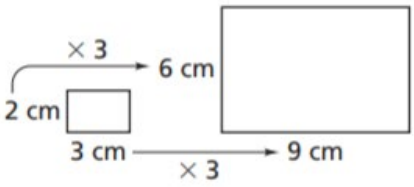
Applying a scale factor of 2 to a figure increases the area by a factor of 4.

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).



On the CMP Parent Web Site, you can learn more about the mathematical goals of each unit. See the glossary, and examine worked-out examples of ACE problems. https://connectedmath.msu.edu/families/