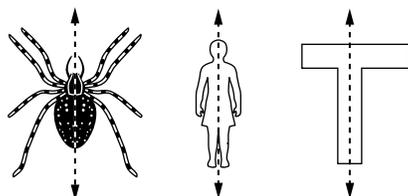# Family Letter

Unit 10: Reflections and Symmetry

In this unit, your child will take another look at geometry, with an emphasis on symmetry. Many objects in nature are symmetric: flowers, insects, and the human body, to name just a few. Symmetry is all around—in buildings, furniture, clothing, paintings, and so on.

The class will focus on **reflectional symmetry,** also called **line symmetry** or **mirror symmetry,** in which half of a figure is the mirror image of the other half. Encourage your child to look for symmetric objects, and if possible, to collect pictures of symmetric objects from magazines and newspapers. For example, the right half of the printed letter T is the mirror image of the left half. If you have a small hand mirror, have your child check letters, numbers, and other objects to see whether they have line symmetry. The class will use a device called a **transparent mirror,** which is pictured below. Students will use it to see and trace the mirror image of an object.
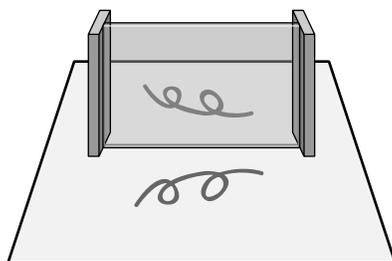
Geometry is not only the study of figures (such as lines, rectangles, and circles), but also the study of transformations or "motions" of figures. These motions include **reflections** (flips), **rotations** (turns), and **translations** (slides). Your child will use these motions to create pictures like the ones below, called **frieze patterns.**
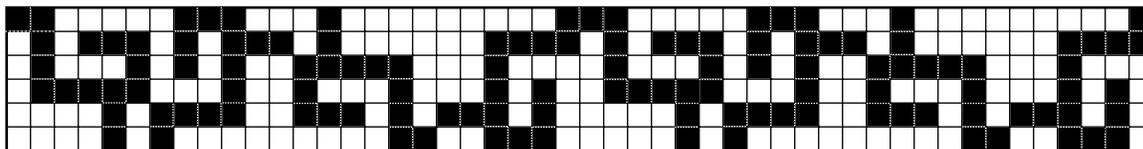
Students will also work with positive and negative numbers, looking at them as reflections of each other across zero on a number line. They will develop skills of adding positive and negative numbers by thinking in terms of credits and debits for a new company, and they will practice these skills in the *Credits/Debits Game.*

Please keep this Family Letter for reference as your child works through Unit 10.

Vocabulary

Important terms in Unit 10:

frieze pattern A geometric design in a long strip in which an element is repeated over and over. Frieze patterns are often found on the walls of buildings, on the borders of rugs and tiled floors, and on clothing.
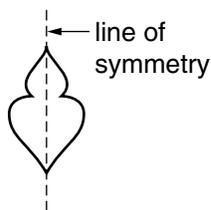
image A figure that is produced by a transformation of another figure. See *preimage* below.

preimage   line of reflection   image
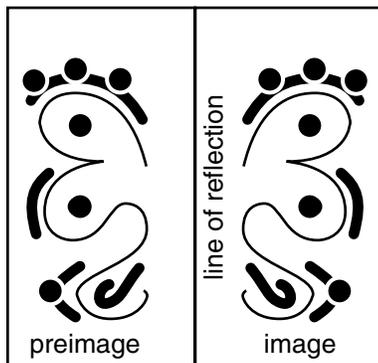
line of reflection A line halfway between a figure (preimage) and its reflected image.

line of symmetry A line drawn through a figure that divides the figure into two parts that look exactly alike but are facing in opposite directions.

line of
symmetry

negative number A number that is less than zero; a number to the left of zero on a horizontal number line or below zero on a vertical number line.

preimage A geometric figure that is somehow changed (by a *reflection,* a *rotation,* or a *translation,* for example) to produce another figure. See *image* above.

reflection (flip) The "flipping" of a figure over a line (the *line of reflection*) so that its image is the mirror image of the original (preimage).
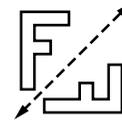
reflection

rotation (turn) A movement of a figure around a fixed point or axis.

symmetry Having the same size and shape across a dividing line or around a point.

transformation An operation on a geometric figure that produces a new figure (the image) from the original figure (the preimage).

translation (slide) The motion of "sliding" an object or picture along a line segment.

translation

Do-Anytime Activities

To work with your child on concepts taught in this unit, try these interesting and rewarding activities:

1 Have your child look for frieze patterns on buildings, rugs, floors, and clothing. If possible, have your child bring pictures to school or make sketches of friezes that he or she sees.

2 Encourage your child to study the mathematical qualities of the patterns of musical notes and rhythms. Composers of even the simplest of tunes use reflections and translations of notes and chords (groups of notes).

3 Encourage your child to incorporate transformation vocabulary—**symmetric, reflected, rotated,** and **translated**—into his or her everyday vocabulary.

Building Skills through Games

In this unit, your child will develop his or her understanding of addition and subtraction of positive and negative numbers by playing the following game. For detailed instructions, see the *Student Reference Book.*

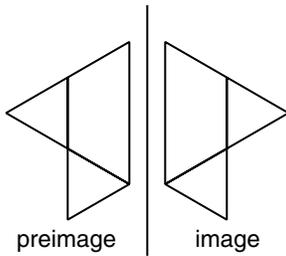**Credits/Debits Game** See *Student Reference Book,* page 192. Two players need 1 complete deck of number cards and a recording sheet to play this game. Playing the *Credits/Debits Game* offers students practice adding and subtracting positive and negative numbers.

Use with Lesson 9.10.
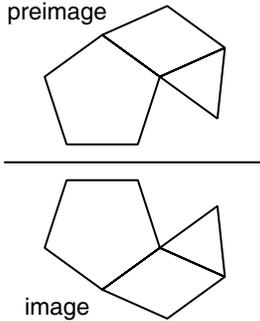
As You Help Your Child with Homework

As your child brings assignments home, you may want to go over the instructions together, clarifying them as necessary. The answers listed below will guide you through some of the Study Links in this unit.
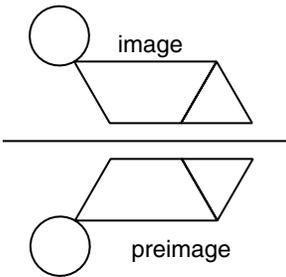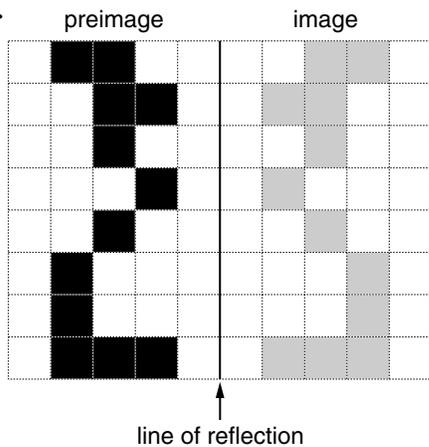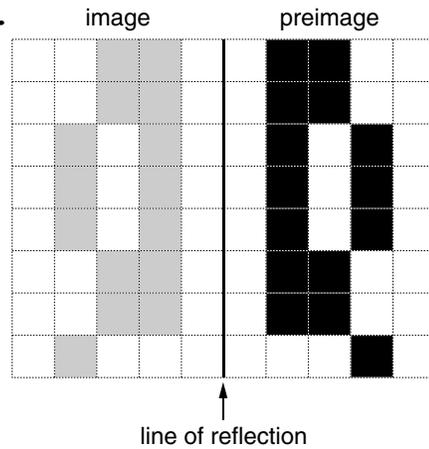
Study Link 10.2

1.

preimage   image

3. preimage

image

5.

image

preimage

Study Link 10.3

1.

preimage   image

line of reflection

3.

image   preimage

line of reflection

Study Link 10.4

2. A H I M O T U V W X Y

3. B C D E H I K O X

4. H I O X

5. O

6. Sample answers:

horizontal	vertical
BOX	TAX
KID	YOU
BOOK	MAT
KICK	HIM

Study Link 10.6

1. <   **2.** <

3. >   **4.** <

5. >   **6.** >

7. -8, -3.4, $-\frac{1}{4}$, $\frac{1}{2}$, 1.7, 5

8. -43, -3, 0, $\frac{14}{7}$, 5, 22

9. Sample answers: 0.3, 0.95, $\frac{8}{8}$, 1.99

10. Sample answers: -2.4, $-\frac{18}{9}$, -1.67, -0.4

11. 13   **12.** 2

13. -20 **14.** -2

15. 19   **16.** 7

17. -5 **18.** -22