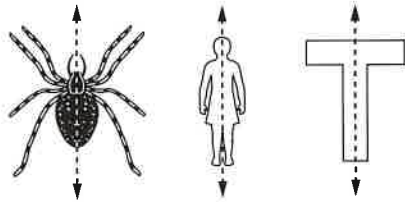


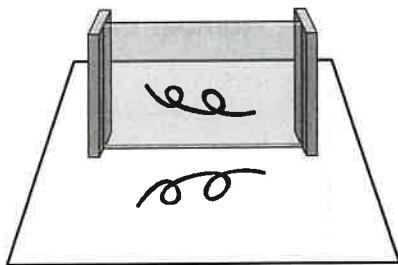


Reflections and Symmetry

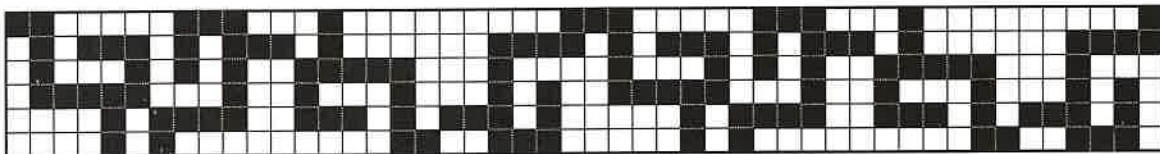
In this unit, your child will take another look at geometry, with an emphasis on symmetry. Many objects in nature are symmetrical: flowers, insects, and the human body, to name just a few. Symmetry is all around—in buildings, furniture, clothing, and paintings.



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 symmetrical objects, and if possible, to collect pictures of symmetrical 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.

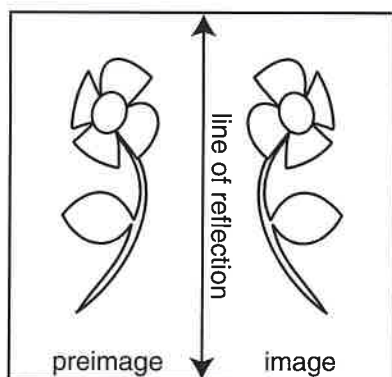
Vocabulary

Important terms in Unit 10:

frieze pattern A geometric design in a long strip in which an element is repeated over and over. The element may be rotated, translated, and reflected. Frieze patterns are often found on the walls of buildings, on the borders of rugs and tiled floors, and on clothing.

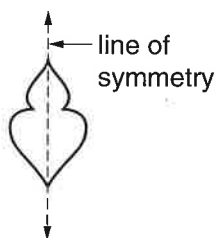


image The reflection of an object that you see when you look in the mirror. Also a figure that is produced by a transformation (reflection, translation, or rotation) of another figure. See *preimage*.



line of reflection A line halfway between a figure (preimage) and its reflected image. In a reflection, a figure is “flipped over” the line of reflection.

line of symmetry A line drawn through a figure that divides the figure into two parts that are mirror images of each other. The two parts look alike, but face in opposite directions.

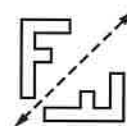


negative number A number that is less than zero; a number to the left of zero on a horizontal

number line or below zero on a vertical number line. The symbol “-” may be used to write a negative number. For example, “negative 5” is usually written as -5 .

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

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; a “turn.”



symmetric Having the same size and shape on either side of a line, or looking the same when turned by some amount less than 360° .

transformation Something done to a geometric figure that produces a new figure. The most common transformations are translations (slides), reflections (flips), and rotations (turns).

translation A movement of a figure along a straight line; a “slide.” In a translation, each point of the figure slides the same distance in the same direction.

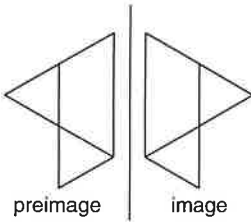
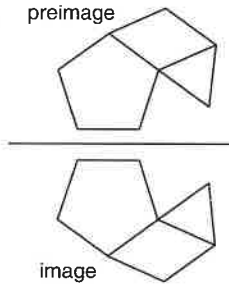
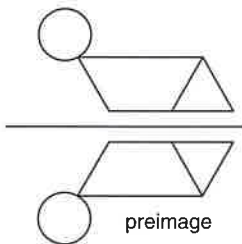


translation

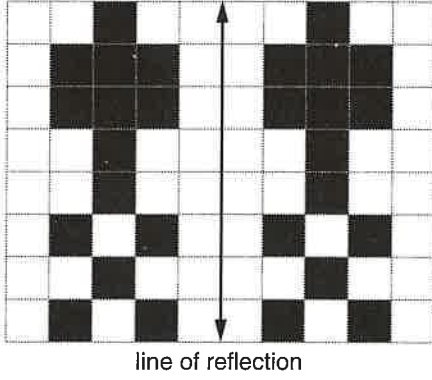
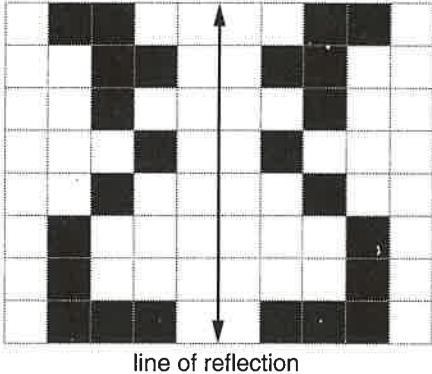
As You Help Your Child with Homework

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.

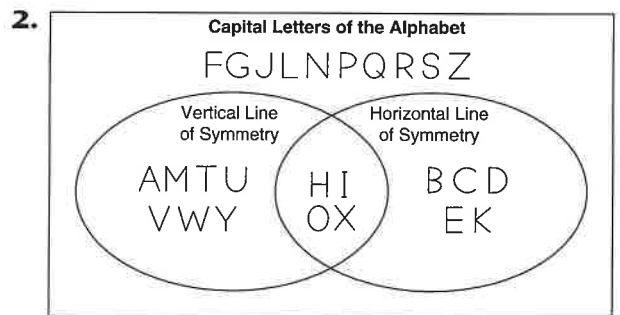
Study Link 10•2

1. 
3. 
5. 

Study Link 10•3

1. 
3. 

Study Link 10•4



3. Sample answers:

| horizontal | vertical |
|-------------------|-----------------|
| BOX | TAX |
| KID | YOU |
| BOOK | MAT |
| KICK | HIM |

Study Link 10•5

1. a. reflection b. translation c. rotation

Study Link 10•6

1. < 2. < 3. < 4. >
5. -8, -3.4, $-\frac{1}{4}$, $\frac{1}{2}$, 1.7, 5
6. -43, -3, 0, $\frac{14}{7}$, 5, 22
7. Sample answers: $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1
8. Sample answers: -2, -1, $-\frac{1}{2}$, $-\frac{1}{4}$
9. a. 13 b. -5 c. -13
10. a. 8 b. -2 c. -8
11. a. 15 b. 11 c. -15

STUDY LINK
10•1

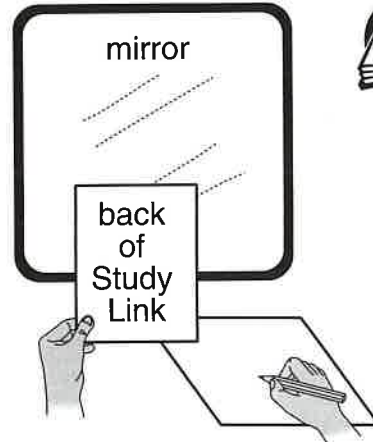
A Reflected Image



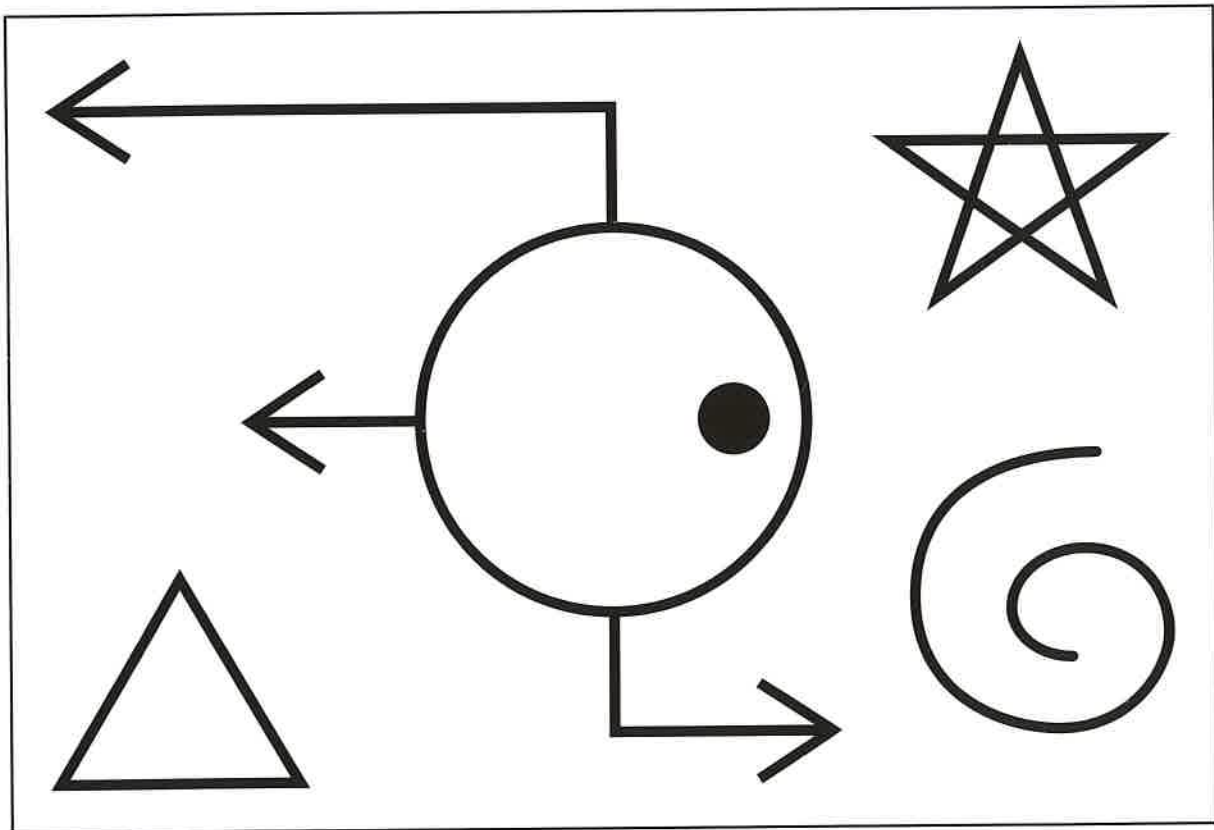
There is a simple design in the box in the middle of this page. It is the **preimage**.

Hold this page in front of a mirror, with the printed side facing the mirror. On a blank piece of paper, sketch what the design looks like in the mirror—the **image**.

Compare your sketch (image) with the design on the Study Link page (preimage). Bring both the preimage and image to school tomorrow.



Sketch the design as it looks in the mirror.


Practice

1. 10% of 130 = _____

2. _____ = 25% of 32

3. _____ = 15% of 120

4. 70% of 490 = _____

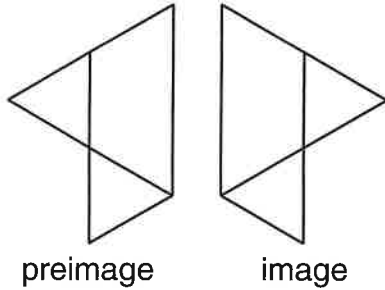
STUDY LINK
10•2

Lines of Reflection

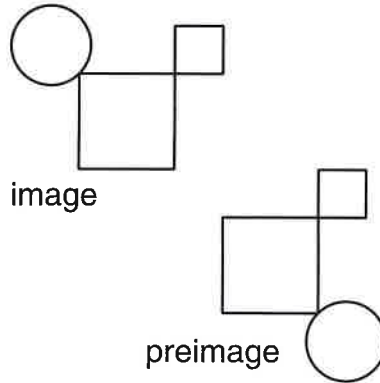


For each preimage and image, draw the line of reflection.

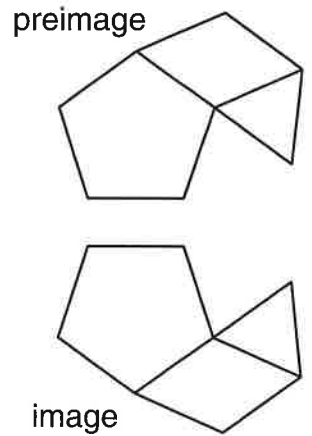
1.



2.

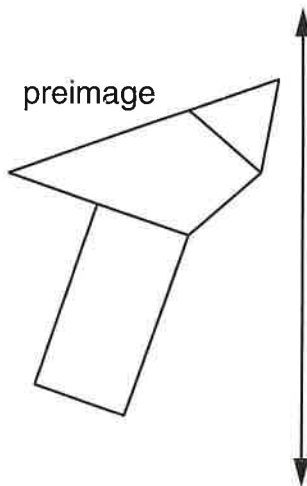


3.

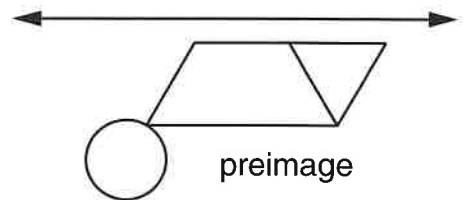


For each preimage, use your Geometry Template to draw the image on the other side of the line of reflection.

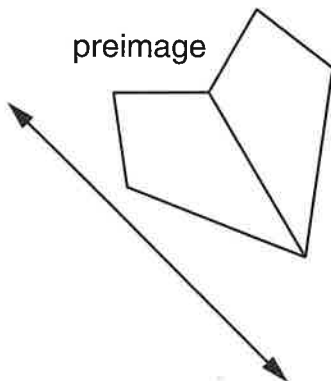
4.



5.



6.



7. Create one of your own.
preimage





Shade squares to create the reflected image of each preimage.

1. preimage image

line of reflection

2. image preimage

line of reflection

3. preimage image

line of reflection

4. image preimage

line of reflection

Practice

5. $54 * 6 =$ _____

6. $29 * 36 =$ _____

7. _____ $= 45 * 45$

8. _____ $= 837 * 63$

STUDY LINK
10•4

Line Symmetry in the Alphabet



1. Print the 26 capital letters of the alphabet below.

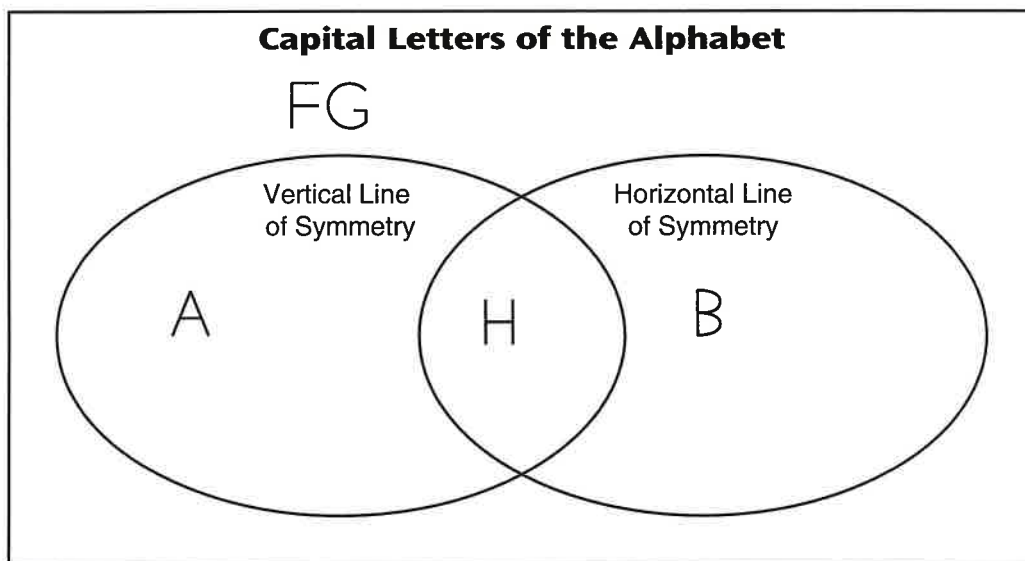
2. The capital letter A has a vertical line of symmetry.



The capital letter B has a horizontal line of symmetry.



Use the letters of the alphabet to complete the Venn diagram.



3. The word BED has a horizontal line of symmetry.



The word HIT has a vertical line of symmetry.



Use capital letters to list words that have horizontal or vertical line symmetry.

horizontal

vertical

Practice

4. $86 \div 9 =$ _____

5. _____ = $68 / 4$

6. $6 \overline{)742} =$ _____

7. _____ = $855 / 7$

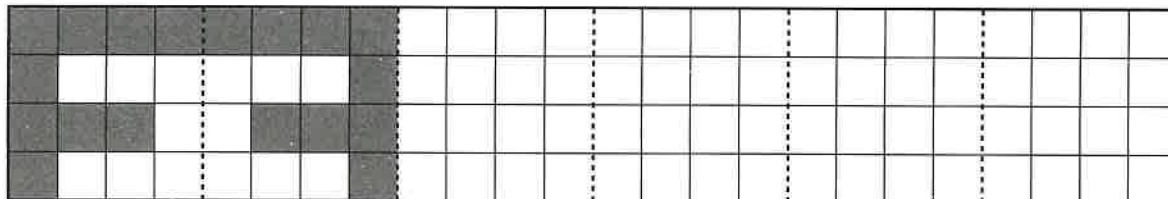
STUDY LINK
10•5

Geometric Patterns

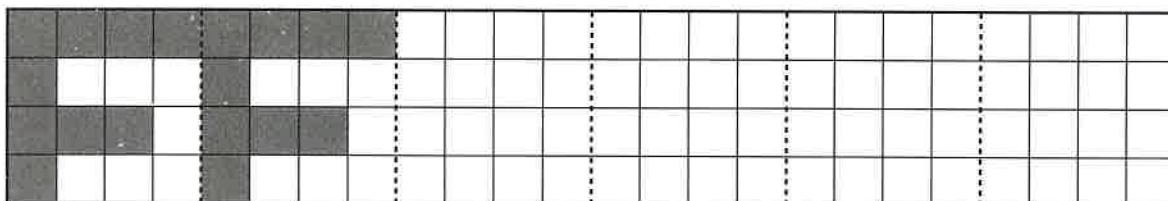


1. Continue each pattern. Then tell if you continued the pattern by using a reflection, rotation, or translation of the original design.

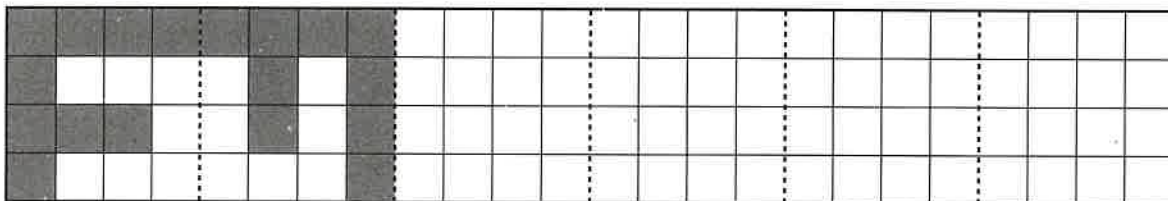
a. _____



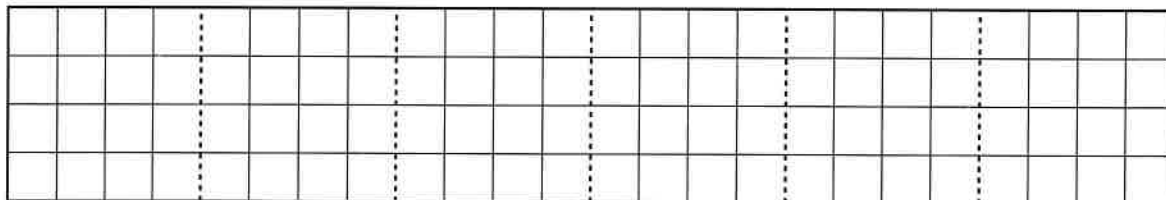
b. _____



c. _____



2. Make up your own pattern.



Practice

3. 50% of \$25.00 = _____

4. 25% of \$10.00 = _____

5. _____ = 40% of \$150.00

6. _____ = 20% of \$250.00

