Activity 2: Graphic Design: Using Symmetry to Create Corporate Logos (Grade Level 6–8)

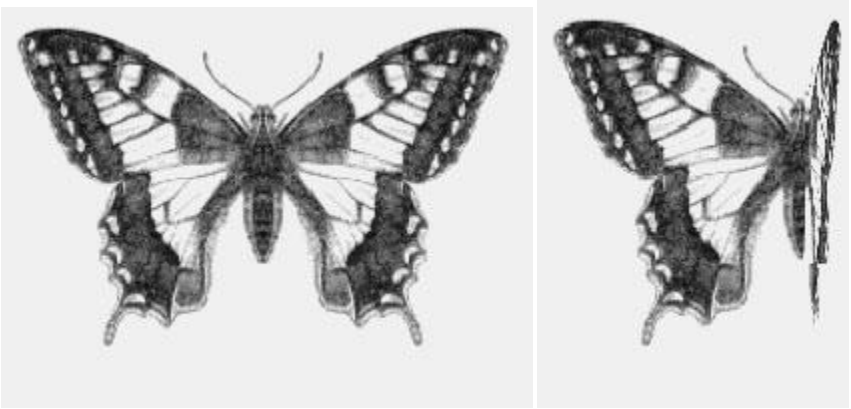
Standards:
Standard 3: Geometry and Spatial Sense (Transformations and Symmetry)
* These standards have been adopted and are based on the information from Principals and Standards for School Mathematics: Discussion Draft, October l998, National Council of Teachers of Mathematics.

Objectives:

- Describe three types of symmetry
- Categorize symmetric figures based on type of symmetry
- Create figures using different type of symmetry

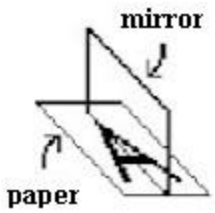
Activity 2

Three simple types of symmetry are reflection, rotation, and translation. In each case, we start with an original image and, using symmetry, we can transform it. Reflection symmetry is sometimes called "mirror" or "flip" symmetry. It's easy to see why. A butterfly (see below) may have reflection symmetry because one side is a mirror image of the other.

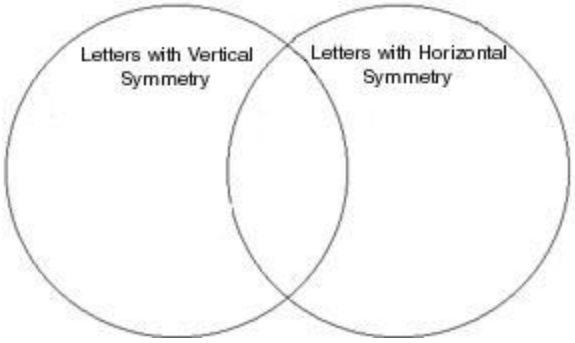


Notice that a vertical line down the center of the butterfly's body serves as what is called the "line of symmetry."

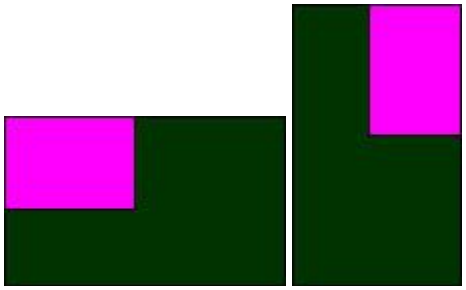
The letter **A** has reflection symmetry similar to the butterfly.



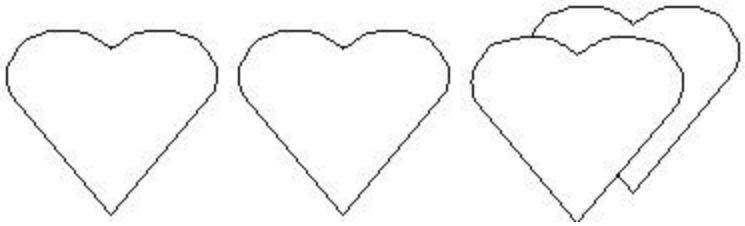
1. Look at the letters of our alphabet below. Organize the letters according to which ones have reflection symmetry into three groups: the letters that have reflection symmetry with a vertical line of symmetry (like the letter A), those with a horizontal line of symmetry, and those with both vertical and horizontal lines of symmetry.
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z



A second type of symmetry is called rotation symmetry. You produce rotation symmetry by turning an object. By rotating the flag on the left 90 degrees, we produce a new flag.



The third type of symmetry is translation symmetry. It is produced by moving the object forward, backwards, or in any direction but do not flip or turn it. The heart shape below (which has reflection symmetry) was translated to three other shapes (or positions).



2. A graphic artist uses symmetry to create designs that become the symbol for companies. These are called corporate logos. Look at the nine examples below (a-i). Can you tell which ones have reflection, rotation, or translation symmetry? For each logo, describe the symmetry you find and how symmetry might have been used to create the logo.

a

b

c

d

e

f

g

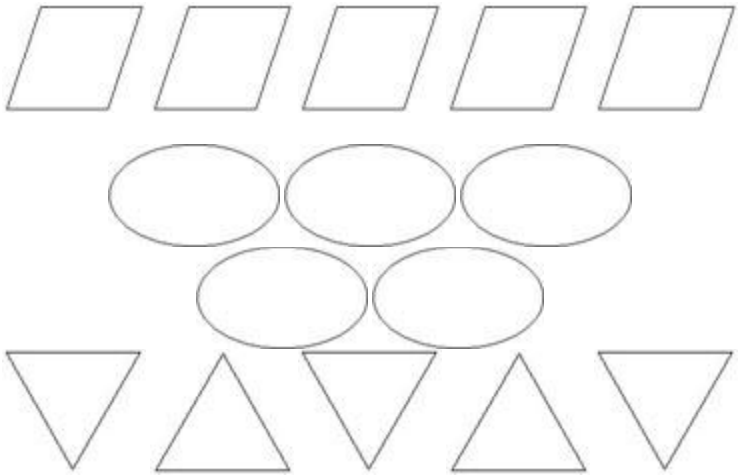
h

i

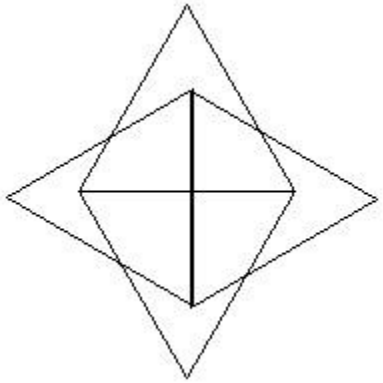
3. Design your own logo. Notice that many logos start with a basic shape, a rectangle, a diamond, or an oval, and then the artist uses symmetry to create the design. The Mitsubishi company logo below began with a diamond that was rotated 120 degrees, then another 120 degrees from that.

a. Pick a basic shape from among those below.
b. Cut out at least three copies and use reflection, rotation, or translation symmetry to create your own logo.

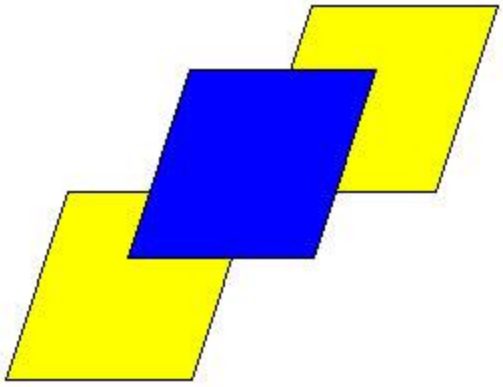
c. Write a description in your own words of the type or type of symmetry you used to create your logo.

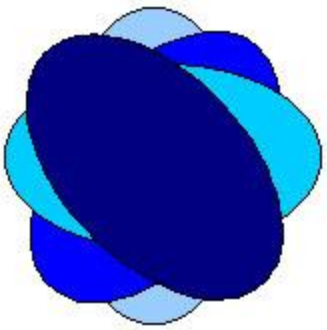


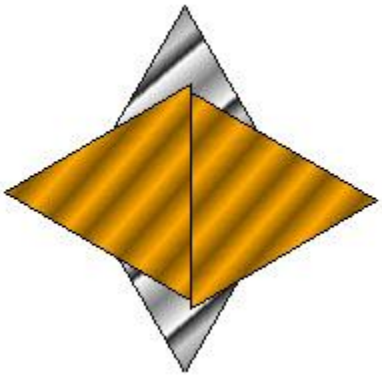
The final figure was achieved by a combination of refection and rotation. One original triangle was first placed on the page, an identical copy was reflected horizontally. Two triangles were rotated 90 degrees. One left in place, the other reflected vertically. The base of each triangle was superposed, then the rotated group was superimposed over the center of the base of the other pair.



Students should be encouraged to use color to enhance their designs:







PBS Mathline

Activity 2: Graphic Design: Using Symmetry to Create Corporate Logos

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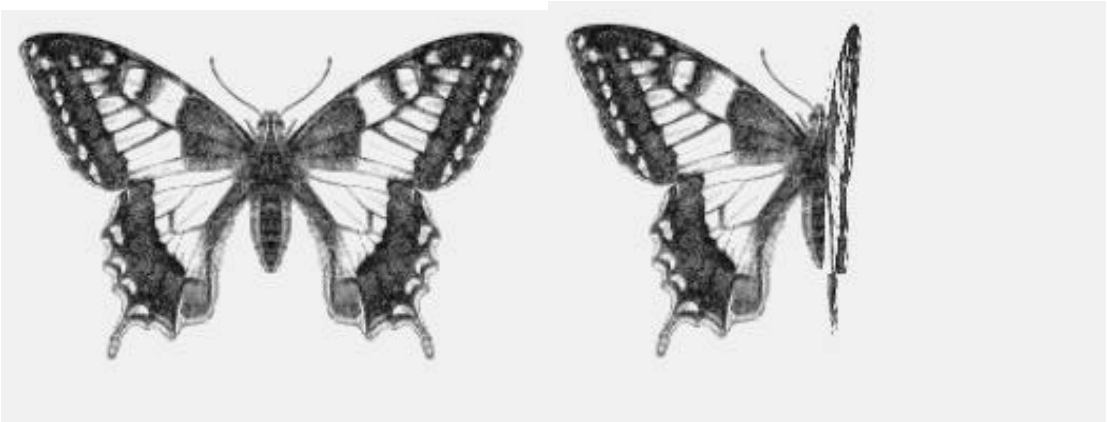

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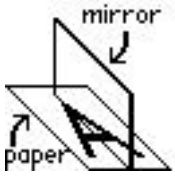

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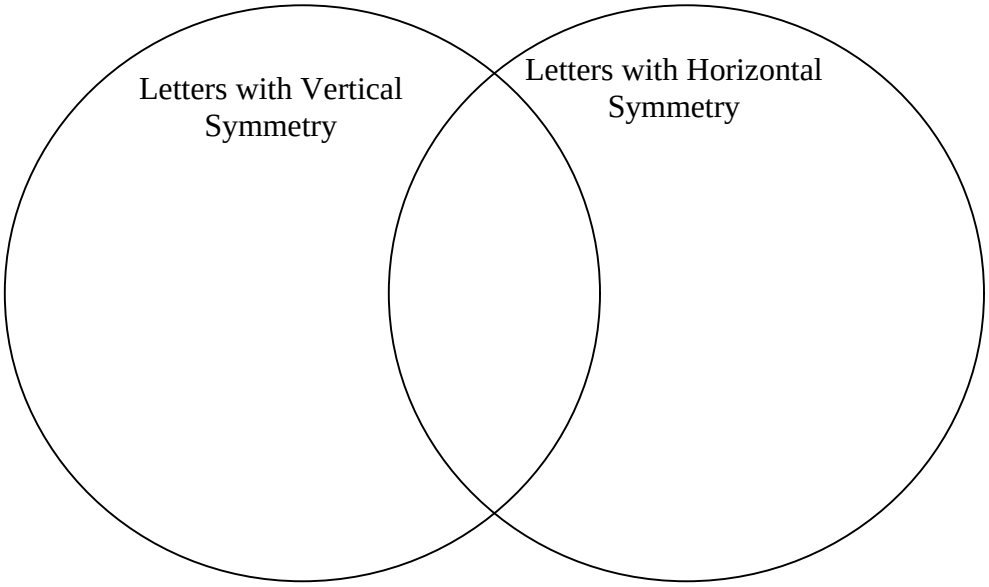

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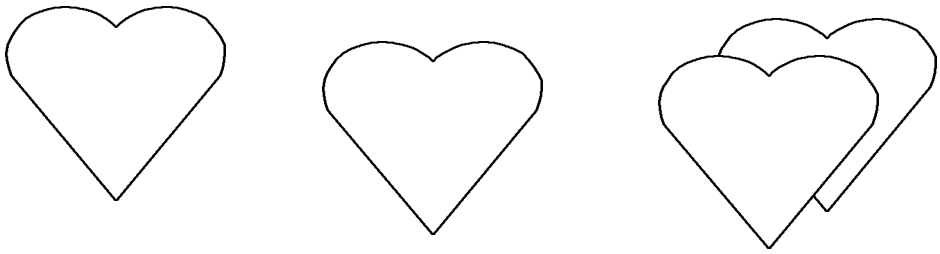

2. A graphic artist uses symmetry to create designs that become the symbol for companies. These are called corporate logos. Look at some of the examples below. Can you tell which ones have reflection, rotation, or translation symmetry? For each logo, describe the symmetry you find and how symmetry might have been used to create the logo.

3. Design your own logo. Notice that many logos start with a basic shape, a rectangle, a diamond, or an oval, and then the artist uses symmetry to create the design. The Mitsubishi company logo below began with a diamond that was rotated 120 degrees, then another 120 degrees from that.

a. Pick a basic shape from among those below.

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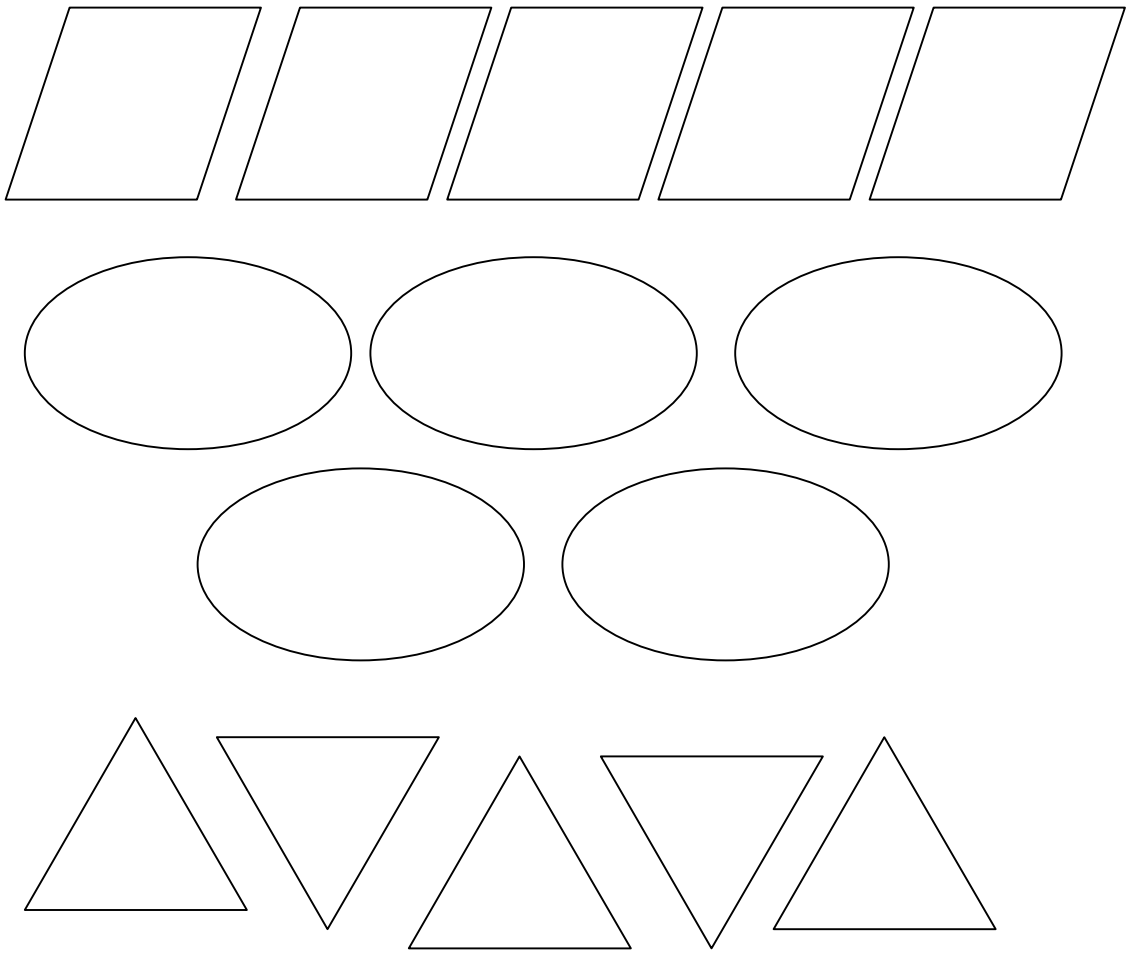
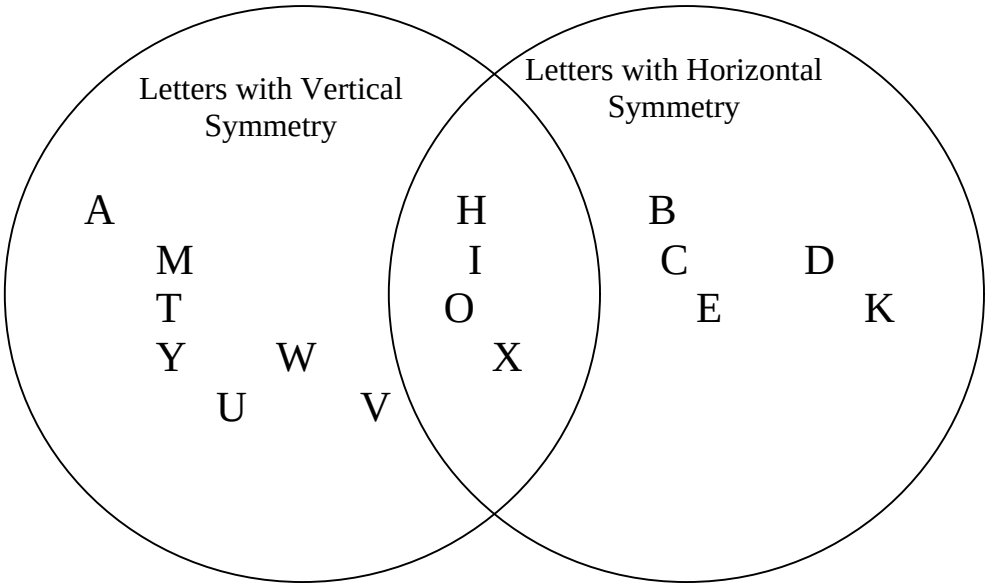
c. Write a description in our own words of the type or type of symmetry you used to create your logo.



Activity 2: Graphic Design: Using Symmetry to Create Corporate Logos
Solutions



2. a. The logo has reflection symmetry across a vertical line through its center. The logo is made up of three ellipses. The two inner ellipses are 90 degree rotations of each other.

b. While the logo does not have rotation or reflection symmetry, it was created using rotation and translation. The basic double-U shape is rotated 90 degrees, then translated.

c. The logo has both vertical and horizontal reflection symmetry.

d. The logo has horizontal reflection symmetry across a vertical line through its center. It also has rotation symmetry. Rotating it 120 degrees gives you the same design. It can be created by taking the basic diamond shape and rotating it 120 degrees two times.

e. Rotation symmetry is evident in this logo. Rotate it 90 degrees, and the same design it the result. The logo can be created by taking the basic three white parallelogram shapes and rotating them 120 degrees.

f. Rotating this design 180 degrees produces the exact same image. This logo has rotation symmetry but not reflection. It might have been created using a 180 degree rotation of the original figure.

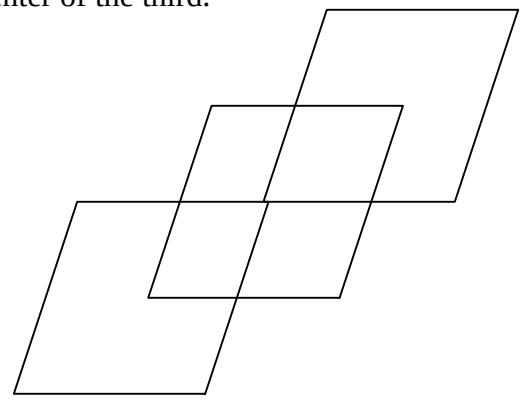
g. If the letters B, M, and W were removed, this logo would have rotation symmetry. It lacks reflection symmetry because of the blue and white colors in the center.

h. The logo has reflection symmetry across a vertical line through its center. If the circle around it were complete, it would also have rotation symmetry. It can be created by rotating the smaller triangle and translating other shapes.

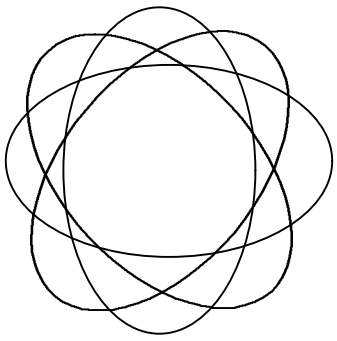
i. This logo lacks reflection and rotation symmetry, but was created by translating the face shape three times to the right placing each in the back.

3. Designs will vary. Below are some sample responses. Encourage students to mix shapes, though each example below was created with one basic shape.

This first was achieved using translation. Two parallelograms were translated so their corners met at the center of the third.



The next design was achieved using rotation. One ellipse was left as it was, three others were rotated 45, 90, and 135 degrees respectively and superimposed on the original.



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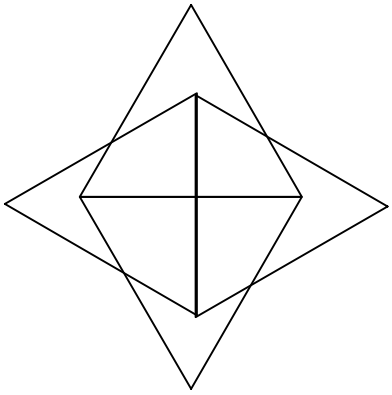
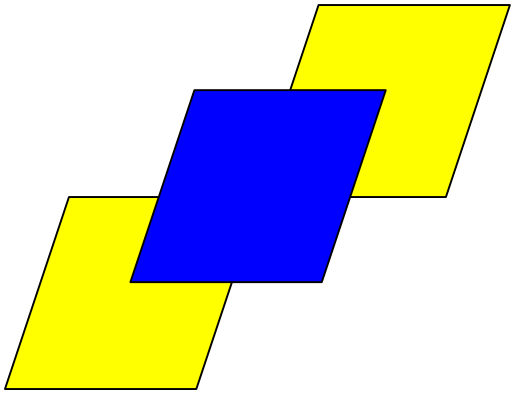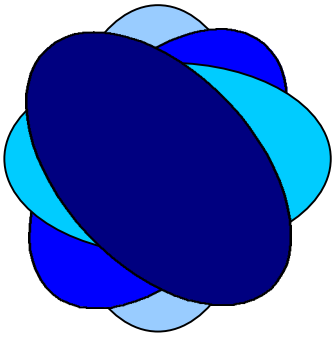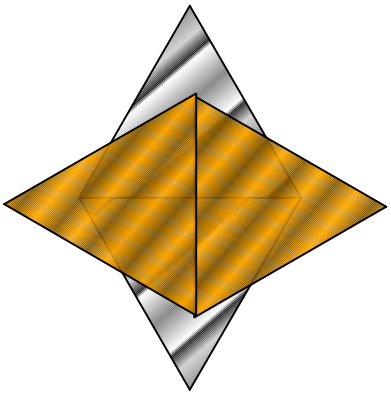
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