# https://marygroveaie.files.wordpress.com/2011/10/portfoliopics06003.jpg?w=150&h=122 Visual Art & Science: Color Pencils & Tessellation

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**Objectives**

* Observing (recording and illustrating) Language Arts, Visual Arts, Mathematics Links
* Comprehending the relationship between reflection, rotation and the characteristic shape of the rhombus polygon. (Geometry Link)
* Identifying the relationship between the rhombus, hexagon, and the structure of architecture, as well as the natural world.
* Applying knowledge of contrasting colors to embellish original artwork.(Design three original images to create symmetrical reflections within the rhombus).
* Communicating the investigation (Language Arts Link)

**Supplies**

· Student copies of structural designs  
· Variety of fruits, vegetables, and pine cones  
· Colored pencils  
· Pre-cut triangles

**Instructional Plan**

**Introduction:**Who can tell us what is meant by the term reflection? Rotation?? Can anyone identify an example of reflection and rotation in the polygons we have been investigating?(5 minutes)

**Procedure:**  
**1st Activity**  
1. Use the bottom edge of the 11×17 sheet of paper, align the bottom edge of the ruler with the edge to create a parallel line (horizontal guide)  
2. Place a point on the center of the line, and measure for 2.5 inches on each side of bisecting point to create a line that is 5 inches in length.  
3. Use a 9×12 scrap sheet of paper, and align the bottom edge with the bottom of the original (worksheet). The vertical edge (longest side) of the scrap paper should then be placed on the bisecting point.  
4. Next draw a vertical guideline.  
5. Experiment with placement of the ruler to arrive at a diagonal line that is exactly five inches in length (this will be the first side of the triangle)  
6. Repeat the procedure on the opposite side to create the second side of the triangle.  
7. Use the scrap paper, this time aligning the short edge (9 inch side) with the side of the 11×17 worksheet, and the long edge (12 inch side) exactly at the apex of the triangle (draw a second horizontal guideline across the worksheet).  
8. Repeat the procedure to measure and draw 5 inch diagonal lines to create 5 triangles that rotate exactly 180 degrees around the original triangle each time the sequence of triangles are repeated (the students’ finished rotations should create a hexagon that has two, five inch sides on either side of its vertices.

**2nd Activity**  
1. Lab Groups of 4-5 students will investigate rotating a template of an equilateral triangle     to produce a reflection of the original position (the result is a perfect rhombus).  
2. Continue rotating the triangle five more times (students should be instructed at this point to write and compare the first activity to the second). Students should realize the second method was an easier say to create the hexagon.

**3rd Activity**  
1. Analyze reference copies of bridges and other architecture to identify polygons, especially the triangle as part of structural designs.  
2. Analyze a banana (pentagon), pinecone (triangle), and any other fruit or vegetable obtainable that is easily identified with the inherent polygon figures.  
3. Complete the Identifying Polygons worksheet.  
4. Use the remaining class period to discuss knowledge of contrasting colors.

**4th Activity**  
1. Students will draw one-half of a face on each side of a triangle (students should create this activity using copies of the rhombus).  
2. Students should be encouraged to balance the negative and positive space inside of the triangle with their three faces. Each face should be different designs.  
3. Students may further embellish their symmetrical drawings within the rhombus figure.  
4. Fold the rhombus exactly in half and trace the images onto the second triangle of the rhombus (the finished work should be a symmetrical reflection inside of the rhombus).  
5. Students should make 12 copies of the finished drawing.

**5th Activity**  
1. Select contrasting colors to fill in the negative and positive space within the 12 copies (students should be encouraged to color the figures carefully and methodically to achieve color saturation).  
2. Cut out the 12 rhombus figures and arrange into a final Hexagon with symmetrical reflection throughout (encourage students to cut carefully along the outer edge of the lines in order to achieve the best alignment, however, there will still be some distortion due to the copier, and students should be told that they will have to manipulate the figures slightly to achieve the best results).

**Summary/Assessment**  
Review the terms reflection and rotation.

**Assessment**

1. Demonstrate Comprehension of objectives by completing the investigation to identify reflection, and rotations.
2. Accurately identify and write in student journals the corresponding polygons found within nature (fruits and vegetables)
3. Ongoing assessment of 12 rhombus figures that are examples of symmetry and color contrast.