

## *Mathematics in Art?*

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**Keywords:** M. C. Escher, tessellation, symmetry, polygons, geometric figures, angles

**Curriculum Area:** Math, Language Arts, and Art

**Grade Level:** Fifth grade

**Appropriate Group Size:** Whole Class

**Time:** 1-2 weeks

### **Instructional Objectives:**

Students will:

1. be introduced to geometric figures and polygons.
2. be visually introduced to tessellations and lines of symmetry.
3. observe what makes a tessellation.
4. share their tessellation with classmates as a means of communication.
5. write about their experience making their tessellation.
6. use strategies to read for meaning in books and websites of M.C. Escher and tessellations history.
7. use technology in the media center and computer lab.
8. display their tessellations throughout the school and share their tessellations with other students.

### **Indiana State Standards:**

1. Measure, identify, and draw angles, perpendicular and parallel lines, rectangles, and triangles by using appropriate tools.
2. Identify, describe, and classify triangles as equilateral, isosceles, and scalene.
3. Identify, describe, and classify polygons, such as pentagons and hexagons.
4. Identify shapes that have reflect ional and rotational symmetry.
5. Understand that 90, 180, 270, and 360 degrees are associated with  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , and full turns.
6. Recognize and develop the use of geometry in nature, art, and architecture.
7. Use technology to explore geometric relationships.
8. Understand and use the larger units for measuring length and their relationship.
9. Analyze problems by identify relationships, telling from irrelevant information, sequencing and prioritizing information, and observing patterns.

### **Materials and Resources:**

1. Images from databases
2. Books and websites
3. Prints represented by the artist

4. Prints represented by the artist

**Images:**

1. M.C. Escher  
Lizards; Symmetry Drawing 25  
[World of Escher](#)
2. M.C. Escher  
Fish and Boats; Symmetry 72  
[World of Escher](#)
3. M.C. Escher  
Symmetry E70; Butterflies,  
[World of Escher](#)
4. M.C. Escher  
Smaller and Smaller  
[Totally Tessellated](#)

**Websites:**

[World of Escher](http://www.worldofescher.com): <http://www.worldofescher.com>

[Totally Tessellations](http://library.thinkquest.org): <http://library.thinkquest.org>

[Indianapolis Museum of Art](http://www.ima-art.org): <http://www.ima-art.org> (Math & Art: symmetry and shape)

[Grove Dictionary of Art Online](http://www.groveart.com): <http://www.groveart.com>

**Resources:***Books:*

[M.C. Escher Kaleidocycles](#) by Doris Schattschneider and Wallace Walker

[Göbel, Escher, Bach: An Eternal Golden Braid](#) by Douglas R. Hofstadter

[M.C. Escher postcards](#) by Benedikt-Taschen Verlag

[M.C. Escher The Graphic Work](#) by Benedikt-Taschen Verlag

[M.C. Escher Visions of Symmetry](#) by Doris Schattschneider

[M.C. Escher, his life and complete](#) by M.C. Escher

[More joy of mathematics](#) by Theoni Pappas

[The World of Escher](#) by M.C. Escher

*CDROMS:*

[Tesselmania](#)

**Museum Resource:**

Indianapolis Museum of Art field trip and/or distance learning What's the Problem? Math and Art

**Preparation:**

The teacher will need to acquire background information on the featured artist, be familiar with the Web sites and books used to be able to introduce this unit.

**Student Instructions:**

1. Show the students different M.C. Escher prints and discuss what they see.
2. After looking at geometric figures and polygons discuss where they have seen them.
3. Invite the kids to compare and contrast the figures.
4. Students choose a polygon and make a tessellation.
5. Introduce Tesselmania to the students.
6. Read and discuss translation techniques from Web sites such as Totally Tessellation and World of Escher.
7. Read about M.C. Escher and tessellations at Grove Dictionary of Art Online Web site.
8. Invite students to create their own tessellation.
9. Students share their tessellation with the class.
10. Write up the steps in creating their tessellation.
11. Write what they have learned about tessellations and describe what they are.
12. Display mounted tessellations.

**Student Assessment:**

1. Participation in activities will be evaluated.
2. Writing activities will be graded on a rubric.
3. Creation of tessellations through a variety of mediums such as on paper, computer, and puzzle.
4. Appreciation and enthusiasm for art and its role in the world.

**Expansion of Instructional Plan:**

1. Look for tessellations in other places. (floor patterns, mosaics, oriental rugs, tiling)
2. Find other artists that use symmetry and tessellations.
3. Distance learning experience with the Indianapolis Museum of Art.
4. Make puzzles of their artwork.
5. Look at other tessellations students have done on the Internet.
6. Write directions to make a tessellation.

**Family Activities:**

1. Invite students to share their tessellations with their parents.
2. Ask parents to help make puzzles and mount artist work.
3. Have students interview their parents to discover what their parents have seen tessellations.

**Teacher Notes:**

Students will have different artistic abilities and will be able to create a tessellation that fits them. All creations will be different and celebrated.