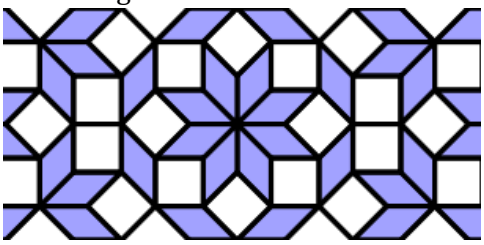
Tessellations Assignment

Date Due: March 28, 2017 (at the **beginning** of class time)

Maurits Cornelis Escher (a.k.a., M. C. Escher), born in Leeuwarden, Holland in 1898, is recognized as both a mathematician and an artist. Escher created unique and fascinating works of art that explore and exhibit an array of mathematical ideas. Mathematicians, who recognized in Escher's work an extraordinary visualization of mathematical principles, were some of his greatest admirers. However, Escher had no formal mathematics training beyond high school.

Tessellations are arrangements of closed shapes that completely cover a plane without overlapping and without leaving gaps. For shapes to fill the plane without overlaps or gaps, their assorted angles must have measures that add up to exactly 360.° Typically, the shapes making up a tessellation are polygons or similar regular shapes.

For the purposes of this assignment, we will draw a distinction between *tessellations* and *tilings*. In this assignment, tessellations refer to *irregular shapes* that are repeated and fit together in intricate ways. Tilings are made with simple polygonal shapes that fit together in simple ways.

Example of Tessellation:	Example of Tiling:
	

Escher took these basic patterns in his tessellations, but he applied reflections, translations, and rotations to obtain a greater variety of patterns. He also "distorted" these shapes to form animals, birds, and other figures. In order to maintain the definition of a tessellation, these distortions had to obey the three, four, or six-fold symmetry of the underlying pattern.

Part I: Tessellation

Use one or more transformations to create an Escher-esque Tessellation on *8.5" x 11" paper (standard computer paper)*.

You will need to make a template to trace, and you will turn this template in with your tessellation. There are complexity points, much like "degree of difficulty" in competition diving or gymnastics. You get more points for attempting a more difficult tessellation.

You can use the computer to create your template, but the tessellation must be drawn by hand.

You can find some ideas about how to construct your tessellation template on Canvas, under "Tessellation Assignment Ideas."

Part II: Written Response

Type a one-page response that specifically answers each of the questions below:

1. What is the idea/theme behind your tessellation?

2. How did you construct your tessellation template(s)?
   Use precise mathematical language from Ch. 8.

3. What transformations did you use to tessellate the plane?
   Use precise mathematical language from Ch. 8.

4. In your opinion, was M.C. Escher an artist or a mathematician? Justify your answer.

Guidelines:

- Each answer in your written response should be numbered to correspond with each question.
- Questions need to be clearly answered, showing insight and understanding, and they must be supported by sufficient detail.
- ***Response must contain fluent use of geometric vocabulary, including proper and precise identification of polygons and transformations.***
- Use a program such as MS Word to write your response, no hand-writing. Use one-inch margins and a size 12, reasonable font. Please double-check your response for errors, such as spelling and grammar.

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Part I (30 points)		
Follows directions	Tessellation covers the entire 8.5"x11" piece of paper. Template is included.	**4**
Organization	Tessellation is a well-organized, interesting display.	**4**
Mathematical Accuracy	Construction is complete, accurate, and satisfies the definition of a tessellation.	**10**
Creativity and Originality	Tessellation uses unique design and patterns of unusual shapes to form a complex and interesting design.	**6**
Complexity	Tessellation was created with intricate polygonal or non-polygonal shapes that connect to create a complex pattern.	**6**
Part II (20 points)		
Completeness of Responses	Question 1 was answered in sufficient detail.	**2**
	Question 2 was answered in sufficient detail.	**2**
	Question 3 was answered in sufficient detail.	**2**
	Question 4 was answered in sufficient detail.	**2**
Mathematical Fluency	Mathematical vocabulary was used fluently throughout the written response.	**5**
Mathematical Accuracy	Questions were answered with mathematical precision and accuracy.	**5**
Follows directions	Response is at least one page of writing, typed, with few spelling or grammar errors.	**2**
Total		**50**