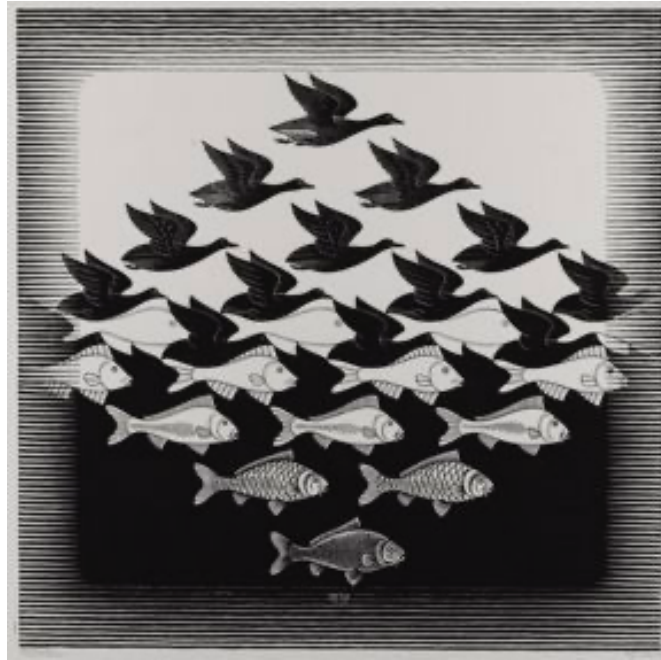


Mathematics and Art

It is a common misconception that Mathematics and Art are unrelated and even two opposing fields, however this could not be more untrue. Math and Art have always been intricately connected.



“Sky and Water I” - Maurits Cornelis Escher

This is one of Escher’s more famous pieces as the fish swimming in the ocean become birds flying in the sky. This is achieved by gradually defining the black shape of the space between the fish (negative space) into the birds in the sky (positive space) and conversely, the shape of the fish (positive space) is transformed into the space between the birds (negative space). His manipulation of geometry and colour which allow the shapes to fit so well together yet be so transformative allowed for a visually intriguing piece that anyone, regardless of having a background in Mathematics, can appreciate.



“Print Gallery” - Maurits Cornelis Escher

Escher had no formal post-secondary mathematical education, but was able to create interesting shapes and unique repetition based on intuition and observation alone. He was very interested in exploring the concepts of symmetry, duality, reflection, relativity, recursion, dimension, and topological change. He was particularly attracted to the depiction of infinity through seamless loops.

This painting shows an endless loop of a young man inside an art gallery gazing at a picture of the seaport of Senglea, Malta, which itself contains an art gallery, where he sees himself looking at the same painting, and so it goes.

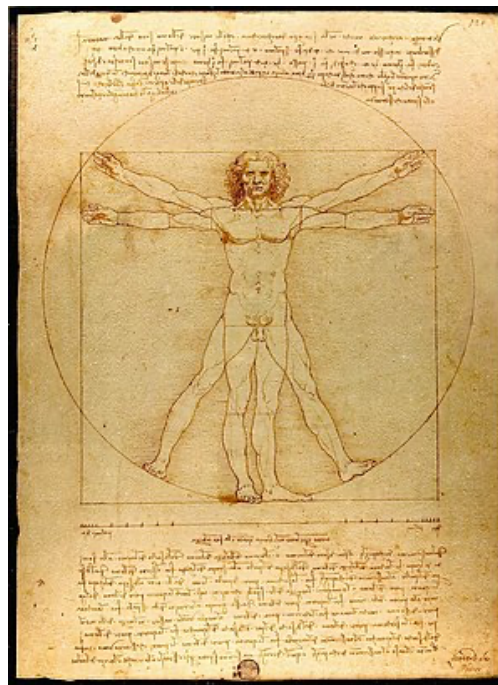
This infinite composition called *Print Gallery* is from the Dutch artist M. C. Escher (17 June 1898 – 27 March 1972). The distortion of the endless repetition of this painting produces impossible shapes. The work is complete and would be seamless had it not been for the blank spot where Escher signed. To understand the Mathematics behind this painting, Professor Lenstra identified what is known as the Droste effect. He noticed that in Escher’s distortion, a sort of looping effect was created as the grid units were small at the center and grew larger as they moved outward and decreased in the opposite direction. After months of experimentation and trial and error; combining rotations, exponential and logarithmic functions, along with reductions in size or scale, the mathematicians were able to come up with the exact formula. Now, using a computer program, they “undistorted” the image, completed the painting at the center, and distorted it once again to give a final, more complete image. The complex mathematical principles that went into producing such a fascinating visual piece could finally be understood.



Tessellations

A Tessellation is a repeating pattern such that there are no gaps between each element. It can be as simple as repeating one or two polygons or as complex as repeating irregular shapes. If the vertex of a polygon can divide 360° to give a whole number, then it is able to form a tessellation. A fun fact is that polygons with an angle greater than 120° cannot tessellate.

Simple video on tessellations: https://www.youtube.com/watch?v=PiOa_vWKJA4



“Vitruvian Man” - Leonardo da Vinci

This is from the Renaissance period and shows man’s interest in artistically representing Mathematics. It creatively depicts the proportions of a man’s anatomy in an aesthetically pleasing and fascinating way. It’s meant to highlight the perfect ratios that exist in the human body.

Other images:

