

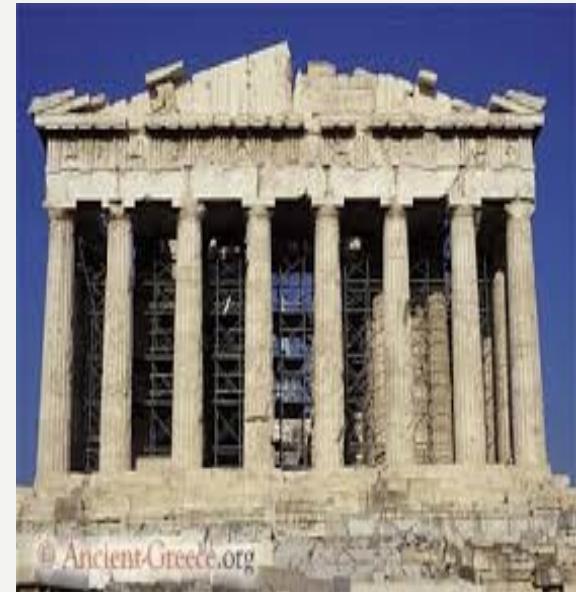
MATHEMATICS IN ART

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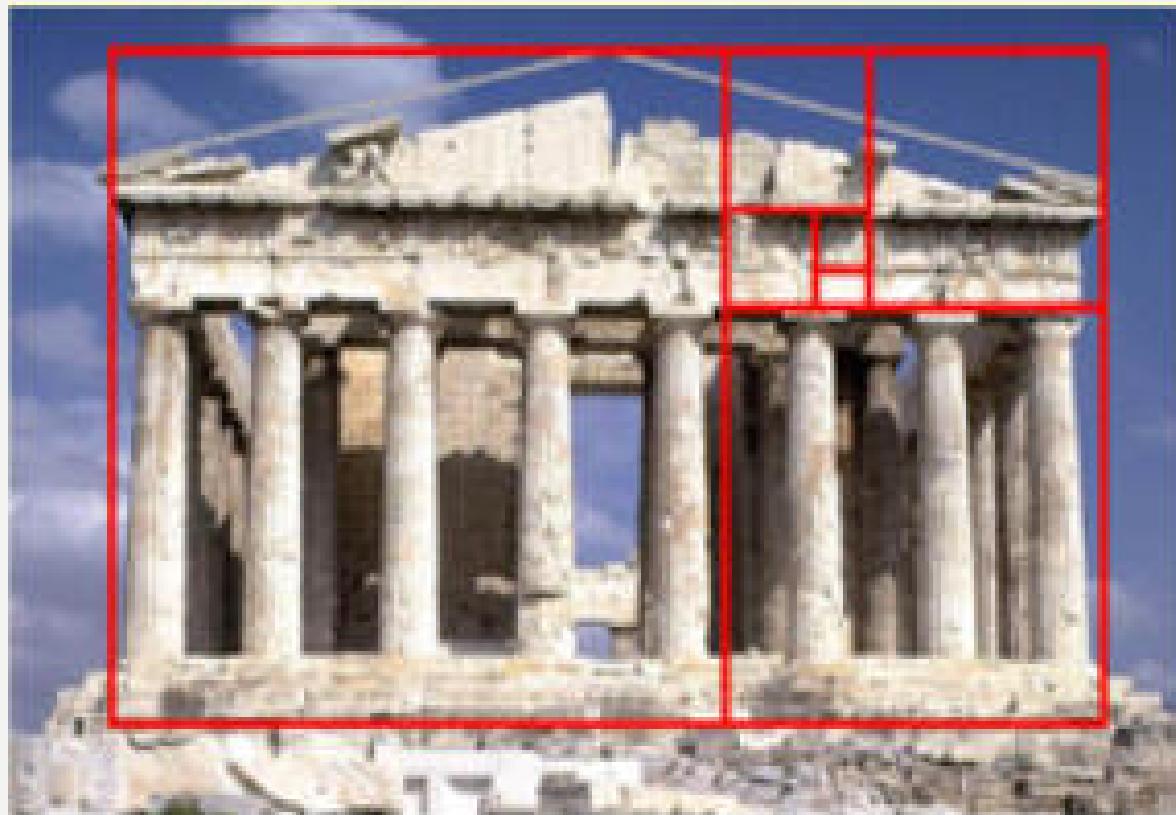
MATH IN ART – THE GOLDEN RATIO & THE PARTHENON

$$\text{Golden Ratio} = L = \frac{1+\sqrt{5}}{2} = 1.61803 \dots$$

- This is The Parthenon, the famous temple dedicated to the goddess Athena. If you take the height of the temple and multiply it by L , you will get the width.



MATH IN ART – THE GOLDEN RECTANGLE AND THE PARTHENON



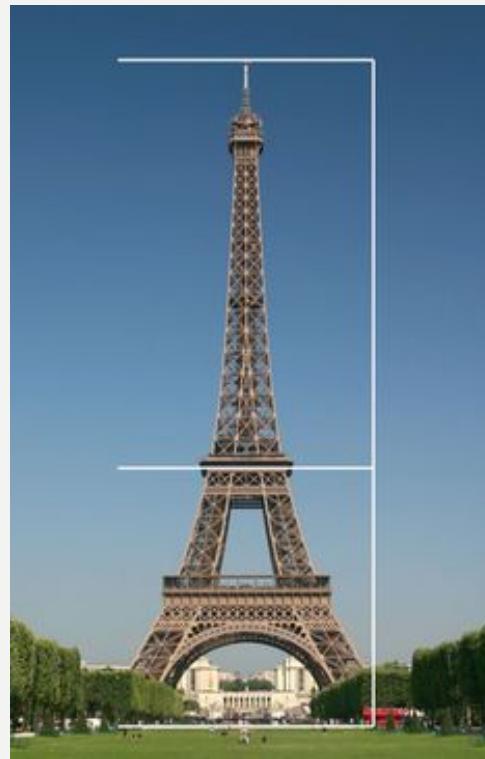
- A golden rectangle is a rectangle whose side lengths are in the golden ratio.
- The structure itself is shaped as a golden rectangle and subdivisions of the building's features also form golden rectangles.

GOLDEN RECTANGLES – MONA LISA

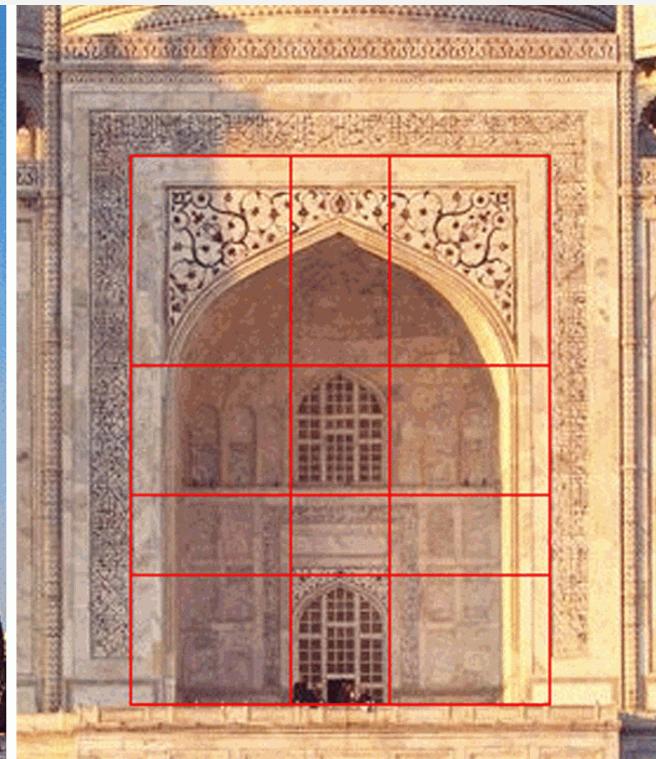
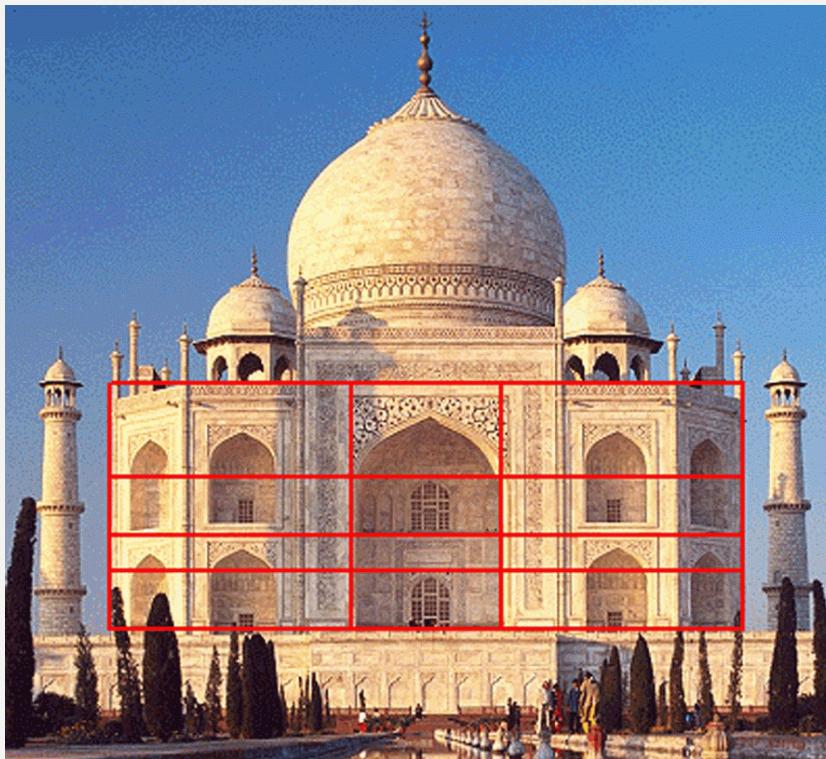
The *Mona Lisa* has many golden rectangles throughout the painting. By drawing a rectangle around her face, we can see that it is indeed golden. If we divide that rectangle with a line drawn across her eyes, we get another golden rectangle, meaning that the proportion of her head length to her eyes is golden. There are other golden rectangles that can be drawn on the rest of her body, like from her neck to the top of her hands.



GOLDEN RECTANGLES – EIFFEL TOWER



GOLDEN RECTANGLE – THE TAJ MAHAL



MATH IN ART - SYMMETRY

Symmetry comes from the Greek word *symmetria* which means “with measure.” In mathematics, symmetry has a very precise meaning: a mathematical object is invariant to reflection, rotation, scaling, and various other transformations.

MATH IN ART – SYMMETRY & THE BRAIN

- Our brains seek out symmetry whether we are trying to or not. It exists in nature (just look in the mirror or perhaps at your pet), hence we have been wired to seek out symmetry. If you look at pieces of art, the most famous, and some many consider “beautiful” seem to all share this symmetric trait.

MATH IN ART – SYMMETRY & THE BROOKLYN BRIDGE

- Here is a photo of the Brooklyn Bridge. Notice the symmetry.



MATH IN ART – SYMMETRY & THE U.S. CAPITOL



MATH IN ART – SYMMETRY & ISLAMIC ART

- The image to the right is from a ceramic tile formed from a piece of Islamic art which are known for their high levels of decoration. Although the piece is not “perfectly” symmetric, you can see that the layout is symmetric.

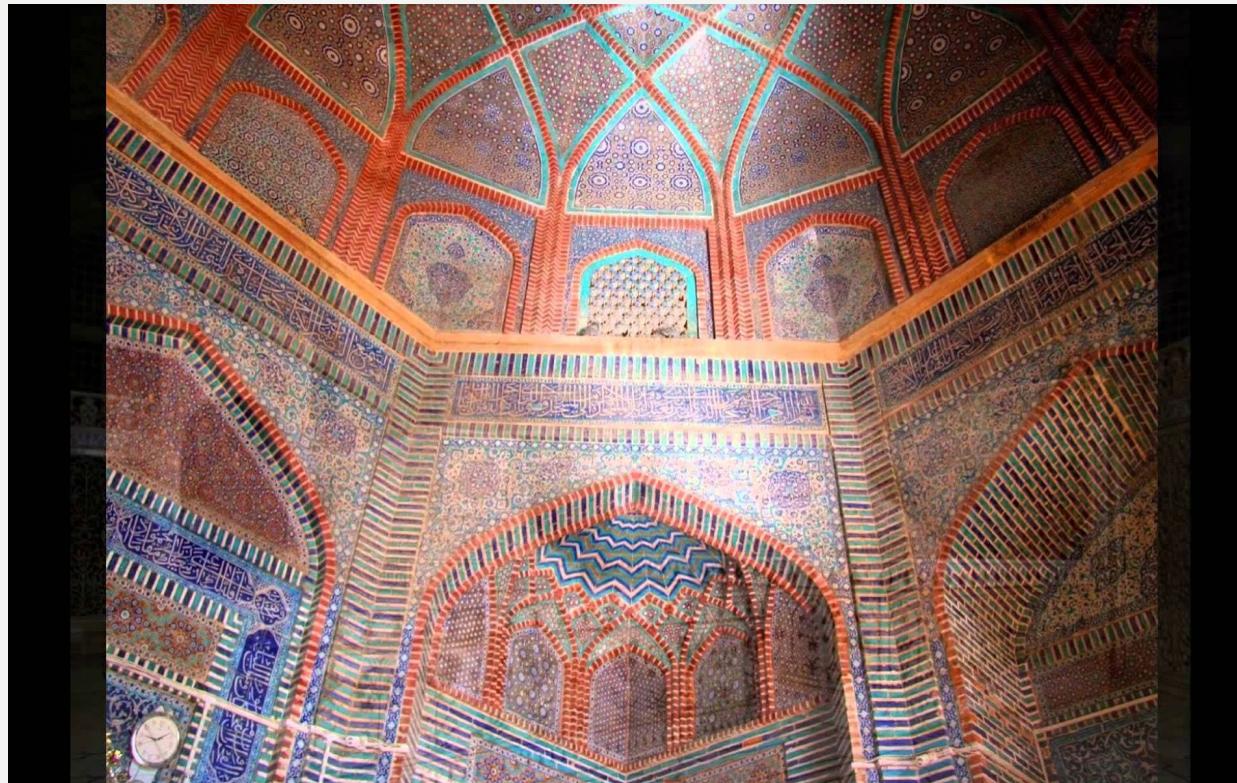


MATH IN ART – SYMMETRY & PERSIAN RUGS

- Here is a typical Persian rug. Imagine a line drawn across horizontally and vertically and you will notice the symmetry. This possesses line symmetry.

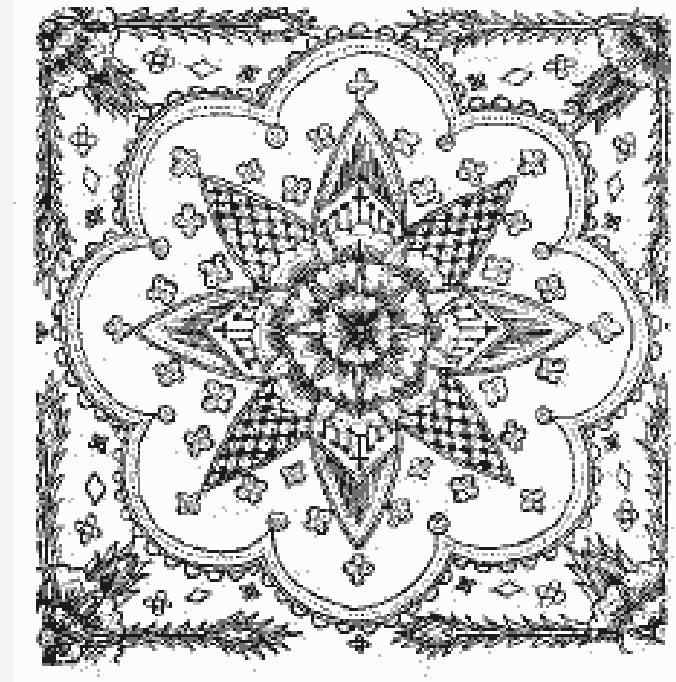
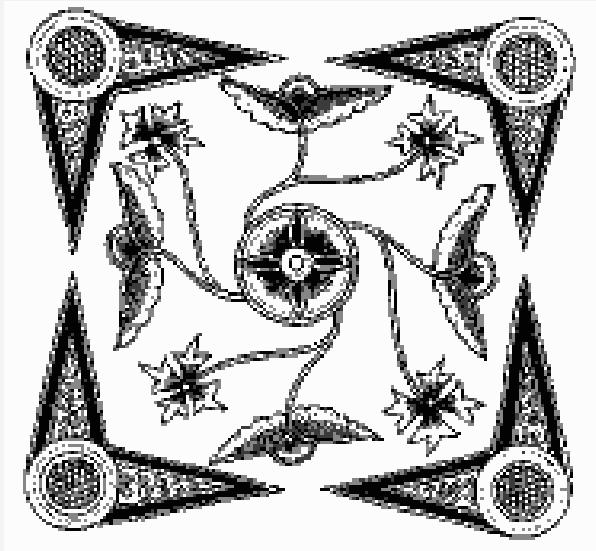


MATH IN ART – SYMMETRY & ARCHITECTURE



MATH IN ART – ROTATIONAL SYMMETRY AND TEXTILE DESIGN

Here are two examples of rotational symmetry. Notice that if we “rotate” the picture, the pieces will “fall on itself”.



ESCHER DRAWINGS

