***Maths and Art: Investigating the symmetry and patterns via Digital Tools inspiring of the “Xysta”, traditional architectural design in Pyrgi, Chios***

***By Vasiliki Boltsi***

**Point Symmetry**

**School subjects:** Mathematics

**Level: 1st**-2nd grade of junior high school (13-14 years- old)

**Language:** English

**Short description:** **Students observing beautiful traditional geometric designs and patterns carved on the wall of traditional buildings in Pyrgi, Chios will discover the different kind of symmetry that dominates the shapes** **because of which there is a highly aesthetic effect conferming the relationship between matthematics and art. They will focus on central(point) symmetry**

**Estimate time**: 45 min (part 1+2) (in classroom) 45 min (part 3) + homework

**Tags:** math, art, central symmetry, point symmetry, rotation, transformation, architecture, Pyrgi, Chios

**Learning objectives:**

* Exploring the Relationship between Art and Mathematics.
* Enhancing students' understanding Central Symmetry through creative expression and digital tools.
* Working collaboratively on their projects, improving the incorporation of mathematical concepts into their digital artworks and their ability to articulate the mathematical elements in their creations.

**Process:**

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| **scheduling** | **discription** | **activity** | **materials** |
| Part 1. - 15 min  Arousing interest. | 1. We have prepared a presentation of the course with bookcreator   * Video of BBC about “Xysta” of Pyrgi, Chios.   <https://www.bbc.com/reel/video/p0h2sy22/the-greek-island-of-geometrical-wonders> | --Discussion after the video  --Students try to discover mathematical facts on the geometrical decorated buildings walls  - Observation and communication.  We make questions about symmetry | Projectors |
| Part 2. -30 min  The concept of the Point Symmetry | 1. Spotting Point Symmetry at “Xysta” design  2. Introducing the mathematical concept of the Point Symmetry.  3. Classwork into groups (or individual)  <https://www.geogebra.org/m/xUfJ8fyj>  4. Spotting point - symmetry at mosaics, architecture, nature | -Development of observation and mathematical thinking.  -Collaboration, practice development and digital skills | Projectors,  ICT, geogebra,  out off line→ worksheets |
| Classwork/Homework | 1.Into groups (or individual)  <https://www.mathsisfun.com/geometry/symmetry-artist.html>  2. solving S**ymmetry** **puzzle**  <https://www.mathsisfun.com/puzzles/jigsaw-puzzles-index.html> | -Post their tasks in the workbook  ( bookcreator)  -cooperation development  -digital skills  -Creative spirit-practicing on the symmetry | Projectors, tablets , internet |
| Part 3  15 min presentation of groups’ homework  30 min  Introduction to Transformations | 1. The concept of Transformations and especially about the kinds of rotations  2. Challenge question for all class | -Development of observation and mathematical thinking.  -Whole class discussion  - Digital skills | Projectors , tablets, internet  worksheets |
| Homework. | Students will take photos with elements of symmetry. | Post the tasks in the workbook  ( bookcreator)  cooperation development  digital skills |  |

**Digital applications:**

1. Google
2. Bookcreator
3. Geogebra
4. Symmetry Artist

**Useful Links:**

1. BBC Reel - Xysta of Pyrgi:

[The Greek Island of geometrical wonders (bbc.com)](https://www.bbc.com/reel/video/p0h2sy22/the-greek-island-of-geometrical-wonders)

2. Wikipedia information for Xysta-Pyrgi:

[Ξυστά (τεχνική) - Βικιπαίδεια (wikipedia.org)](https://el.wikipedia.org/wiki/Ξυστά_(τεχνική))

3. Geogebra about Symmetry:

[Central Symmetry – GeoGebra](https://www.geogebra.org/m/xUfJ8fyj)

<https://www.geogebra.org/m/cdxdEsUH>

4. Mathsisfun about Symmetry puzzles:

<https://www.mathsisfun.com/puzzles/jigsaw-puzzles-index.html>

**Conclusion:**

Students come into contact with traditional folk art, architecture and culture and discover their direct relationship with mathematical elements.  
Student realize the self-evident presence of mathematics in human activity.  
Students create their own symmetrical artworks  
They develop their collaboration and digital skills acquiring team spirit.  
They are encouraged to discuss with mathematical arguments.