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

***By Vasiliki Boltsi***

**Line 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 in axial (line) symmetry.**

**Estimate time**: 45min (part 1+2) + 45 min (part 3) (in classroom) + 30min homework

**Tags:** math, art, line symmetry, axial symmetry, rotation, transformation, architecture, Pyrgi, Chios

**Learning objectives:**

* Exploring the Relationship between Art and Mathematics.
* Enhancing students' understanding 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:**

|  |  |  |  |
| --- | --- | --- | --- |
| **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 lines-symmetry | Projectors |
| Part 2. -30 min  The concept of the Line Symmetry | 1.Introducing the mathematical concept of the Line Symmetry.  2. Spotting line - symmetry at mosaics, architecture, nature  3. Classwork into groups (or individual)  <https://www.geogebra.org/m/qjVuZShM> | -Development of observation and mathematical thinking.  -Collaboration, practice development and digital skills | Projectors,  ICT, geogebra,  out off line→ worksheets |
| Home work | 1.dividing the students into groups  <https://www.geogebra.org/m/TyUYK7kf>  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 | Projectors, tablets , internet |
| Part 3  Presentations of their homework (10 min)  Cooperation skills (20 min)  Presenations of their classwork (15 min) | 1. Discussion about the line symmetry  2. Classwork into groups (or individual)  <https://www.mathsisfun.com/geometry/symmetry-artist.html> | --Whole class discussion  -Creative spirit-practicing on the symmetry  - 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:

<https://www.bbc.com/reel/video/p0h2sy22/the-greek-island-of-geometrical-wonders>

2. Wikipedia information for Xysta-Pyrgi:

[https://el.wikipedia.org/wiki/%CE%9E%CF%85%CF%83%CF%84%CE%AC\_(%CF%84%CE%B5%CF%87%CE%BD%CE%B9%CE%BA%CE%AE)](https://el.wikipedia.org/wiki/Ξυστά_(τεχνική))

3. Geogebra about Symmetry:

<https://www.geogebra.org/m/TyUYK7kf>

<https://www.geogebra.org/m/VGef7R2m>

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

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.