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**"The magic of the East: from the Alhambra to Sammezzano Castle"
Symmetries in mathematics, nature and art**

Abstract

Everybody knows that students aren't usually fond of Mathematics. As we believe that a sound Mathematics grounding is laid at primary school and during the first years of secondary school, we have chosen a project which has involved children from the age of 9 to the age of 14: all of them are pupils of the Istituto Comprensivo Massimiliano Guerri di Reggello (Florence, Italy). The project is part of a multi-year course entitled "The Pleasure of the Beautiful", which aims at making students appreciate the beauty of mathematics and its relationship with other disciplines. In our work symmetry has been the key word to understand the works of art and architecture, as it is one of the main ideas of twentieth century Mathematics.

"The symmetrical relation between mathematical ideas and the physical world, like the symmetry between our sense of beauty and the most profoundly important mathematical form, is a deep and possibly unsolvable mystery. None of us can say why beauty is truth and truth is beauty. We can only contemplate the infinite complexity of the relationship" (Ian Stewart)

Our project has been inspired by Sammezzano Castle, a beautiful Moorish style building not far from Reggello. The castle was built in 1605 by the Ximenes D'Aragona family and restored by Ferdinando Panciatichi in the second half of the nineteenth century according to the Oriental Style which was very popular in Florence at the time. The castle has got beautiful geometric decoration and tiles influenced by Alhambra mosaics.

AIMS

- Use direction indicator to orient oneself.
- Make routes and draw them.
- Enhance self-effectiveness, self-confidence and cooperation.
- Recognize and operate with symmetries in nature and art using manual tools and software.
- Get a good knowledge of our land from historical, geographical and environmental point of view.
- Being able to speak in public in a different place of school.

SUMMARY OF THE ACTIVITIES

- Tour of Sammezzano Castle.
- Activities in the classroom and the computer lab.
- Planning of the exhibition guided tours.
- Analysis and reproduction of geometric figures, floors, tiles and decorations of the Alhambra and of Sammezzano Castle.

- Floor plan experiences.
- Drawings mandalas with a goniometer and a ruler.
- Geometric transformation such as symmetries, rotations and rotations with a mirror and glossy paper.
- Interdisciplinary laboratory on the geological history of the area surrounding the Castle (Pliocene lake).
- Organization of an exhibition with tours guided by the students.

EXHIBITION OF WHAT HAS BEEN MADE BY THE STUDENTS

- Billboards showing the students' works.
- Drawings and reproductions of geometric motifs made using different techniques (e.g.: collages, temper, geometric drawings with suitable tools ...).
- Reproduction in baked clay of Sammezzano Casle main facade.
- Photos of all the activities.
- Students' exercise books recording all the course on the geological history of the area.
- Photos of Sammezzano Castle tour.
- Videos on symmetries in nature and in Mathematics made by the students.
- Video of the exhibition opening day.

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