

GEOMETRICIAN'S VIEWS

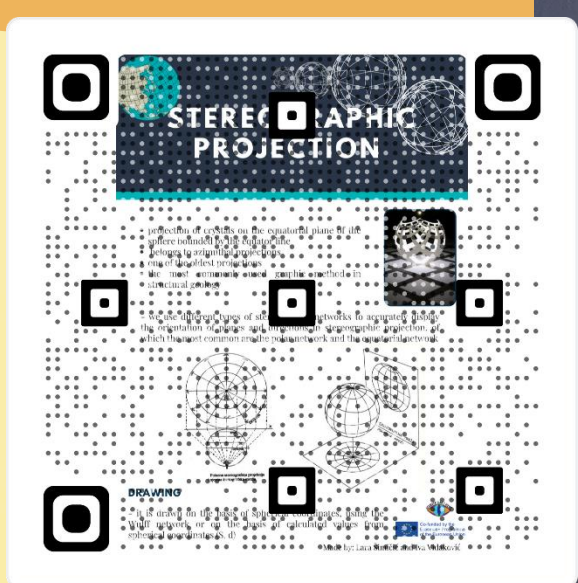
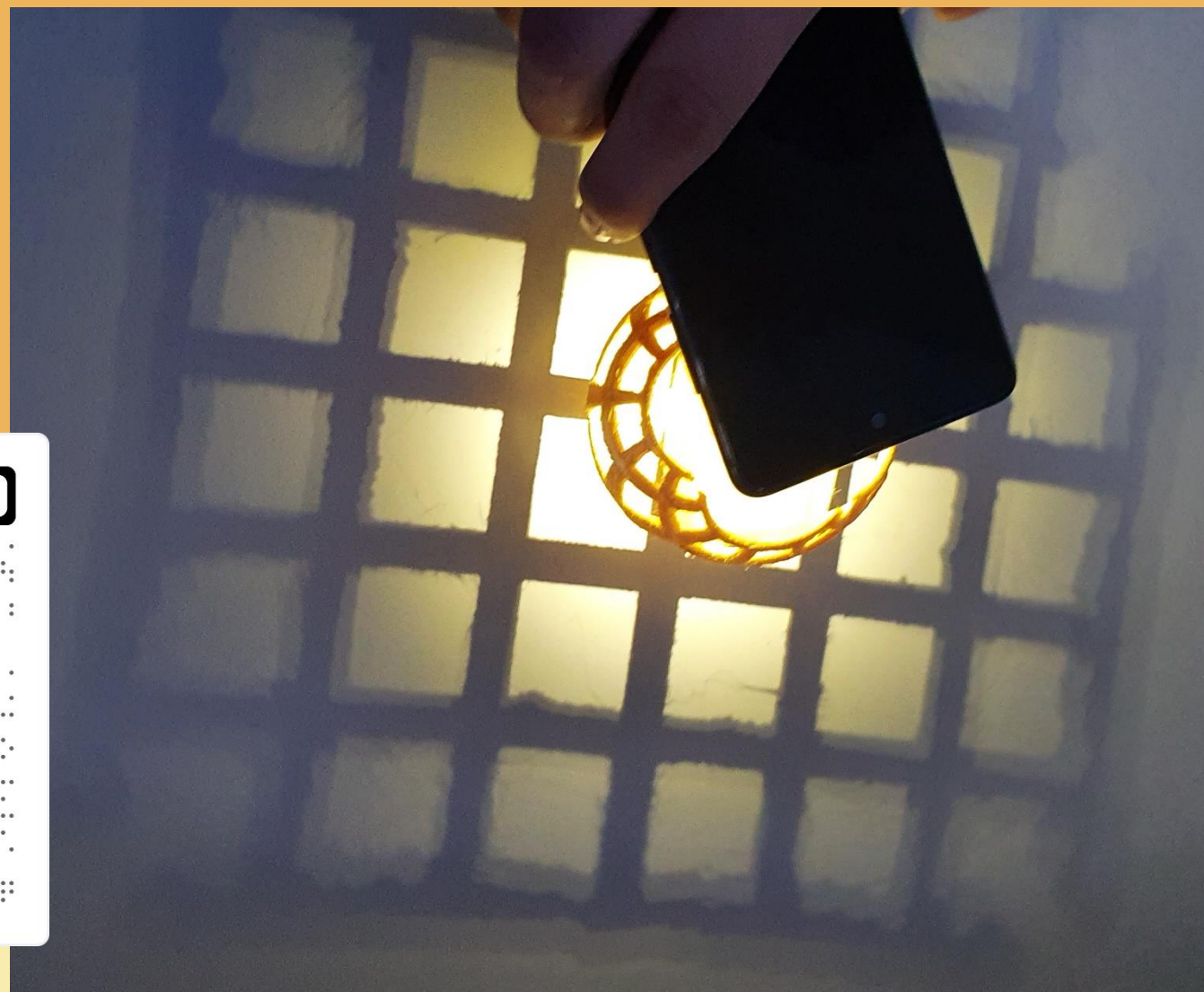
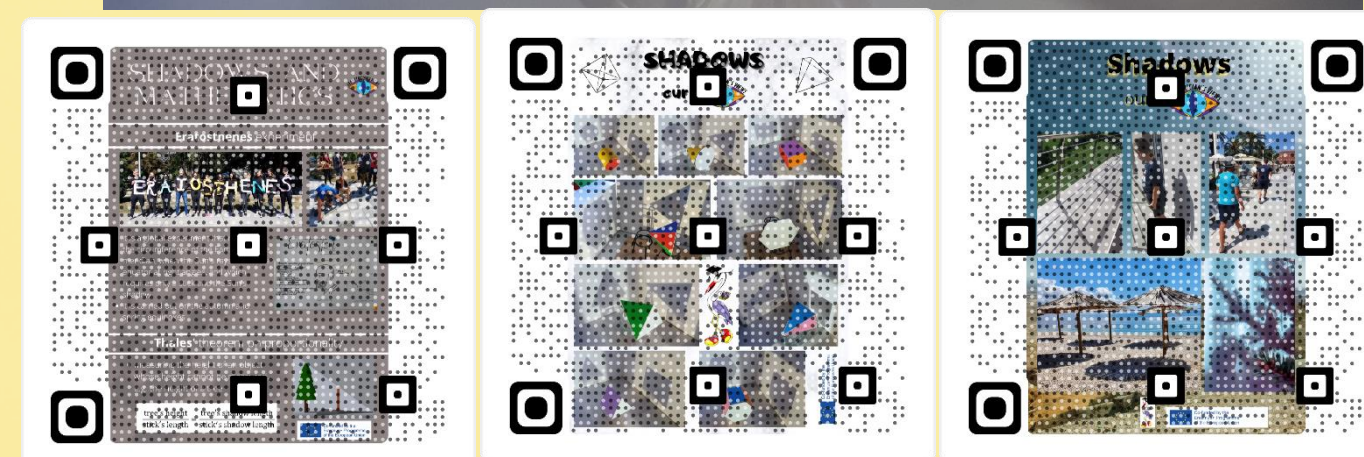
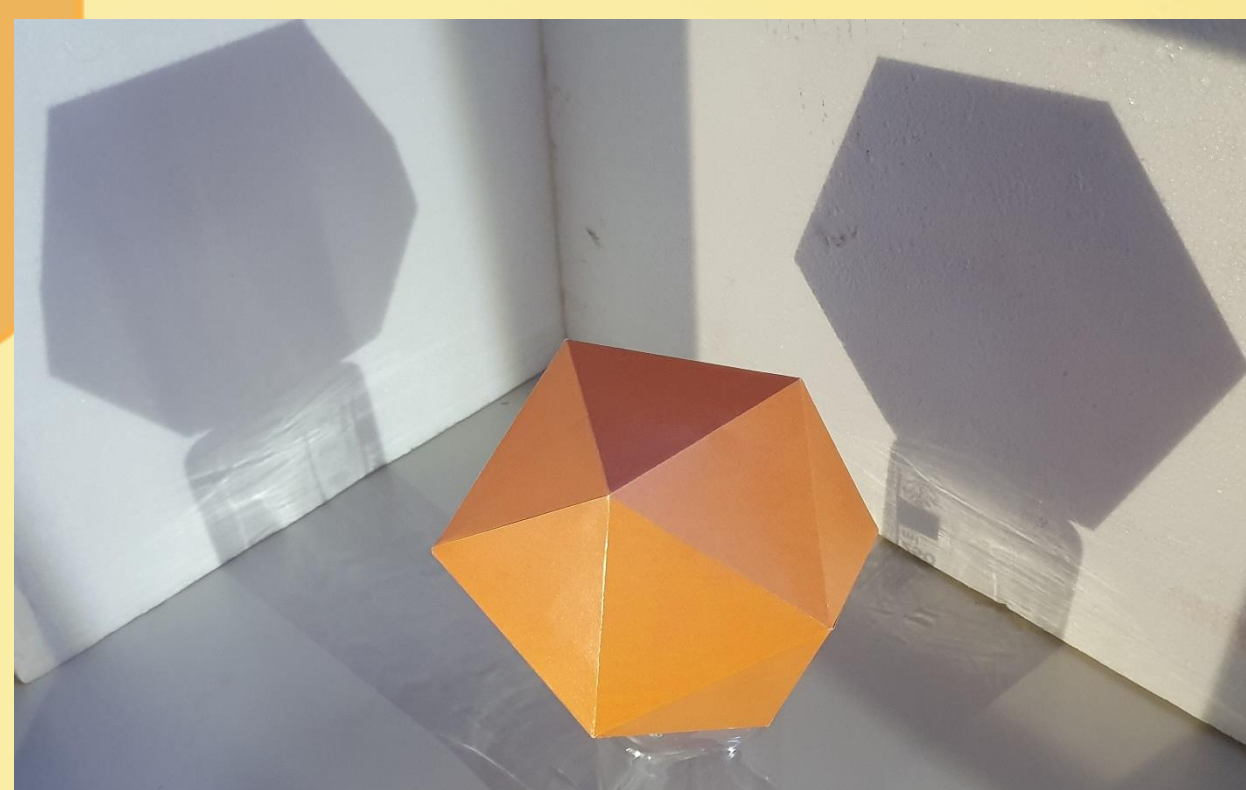
TOPIC: SILHOUETTE SHADOW PROJECTION

RESEARCHER VIEW

Shadows and projections

Students investigate orthogonal projection in space using a light source, concrete models of polyhedrons, and their shadows. This is an excellent example of experiential learning that allows a full experience of this complex and often difficult for students to understand mathematical concepts. The acquired knowledge is connected with Eratosthenes' experiment and Thales' theorem. In addition to the orthographic projection, which divides the 3D object into three 2D forms (front view, top view, and side view), the students go a step further in their research and investigate the stereographic projection that uses polar and equatorial networks and has its great application in structural geology. Through their participation and work on this project, the students enriched their previously acquired mathematical knowledge, connected it with concrete life examples, and opened the door to some new and different representations of 3D space.

Researcher
Željka Dijanić

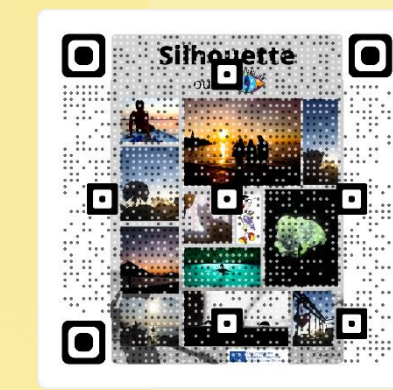


ARTISTIC VIEW

Silhouette and shadows

In this interesting topic, the students were able to combine scenes of refraction of light in relation to the observed object or objects in everyday life situations through the game. Thus, using the medium of photography, they most easily record the moments of the game of light-shadow-silhouette as in a photograph taken in nature where a group of people is in the foreground in relation to the space in which they are. In the photo around the group of people, there is also a representation of the setting sun as a reflection in "realistic" colors, while the objects of the people are actually silhouettes in dimmed colors that are limited by imprecise or unsharp boundary lines. This photo is a great example of the difference between a silhouette and a shadow because, in relation to the background, the lower part of the photo is still visible in contact with the environment, so we can conclude with certainty that it is a silhouette of a group of people and not a recorded representation of their shadows, i.e. reflections in space. In the example of the second photo, which shows a row of beach umbrellas in the foreground while the sea and sky are in the background, we see a realistic representation of the reflection of the object's shadows in relation to the refraction of light in nature during the sun's daily reflection. In the next photo, in a space like a room, the students are playing and observing and subsequently recording with a photo the moment of approaching or moving away from the light source in this example of a lamp that reflects a shadow of a certain pattern towards the surface or table, while the student observer records the whole experience from his perspective with a mobile phone camera. This is how the recorded situation is the game of light, shadow, and silhouette, which is a hand and a mobile phone in one plan, a light source in another plan, and third is the shadow of a pattern on the table, which at the same time encompasses the largest space or plan of this photograph. Using the example of a series of three photos showing three different objects in space, the students showed an object that is in the play of shadow and light. The object in each photo is different and is located in the middle of the space, i.e. in the center of the photo. The objects are shown in different colors, and we have the impression that the object was photographed in a studio room. In contrast, the shadows on the walls around the object are shadows that the objects reflect from themselves on walls that intersect at right angles so that the shadows are completely different and dependent on the refraction of light from the object.

Artist
Ivana Komel



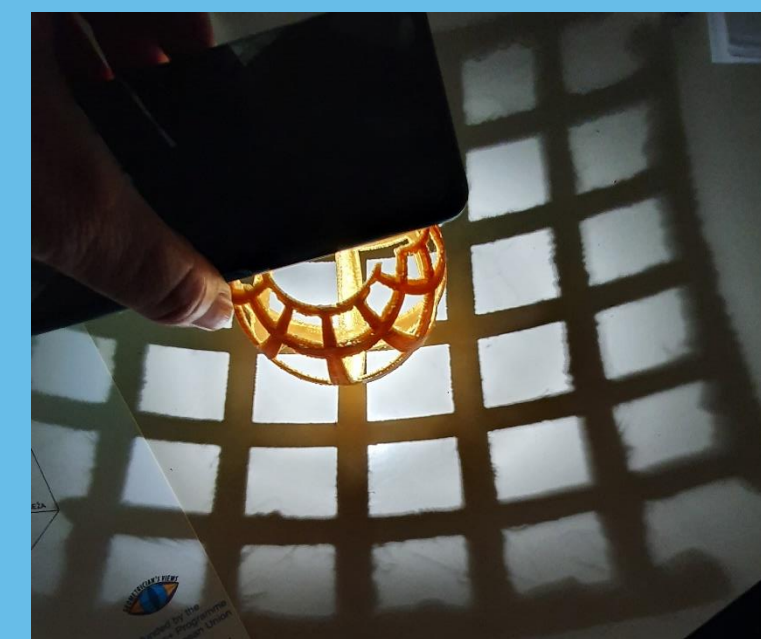
COMMON VIEW



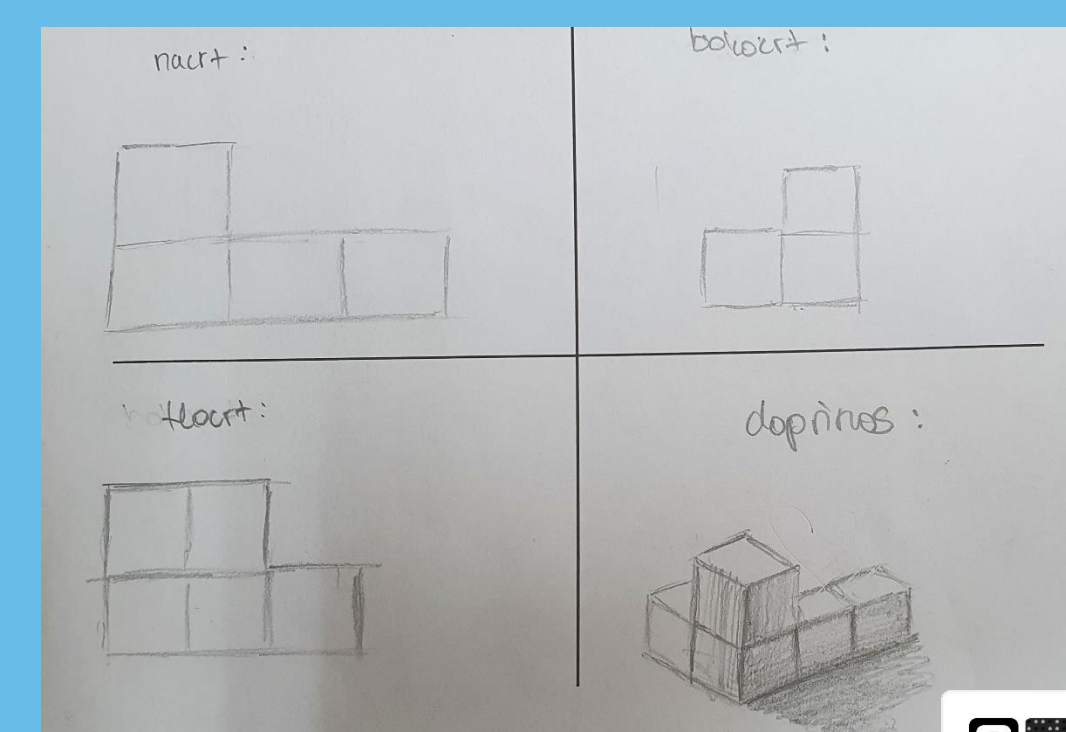
shadow



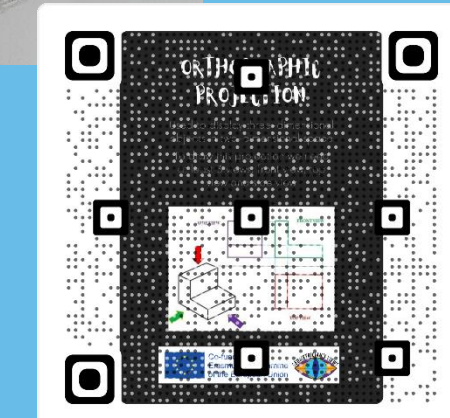
silhouette



stereographic
projection



orthographic
projection



Why three topics in one?

Because they are closely related:

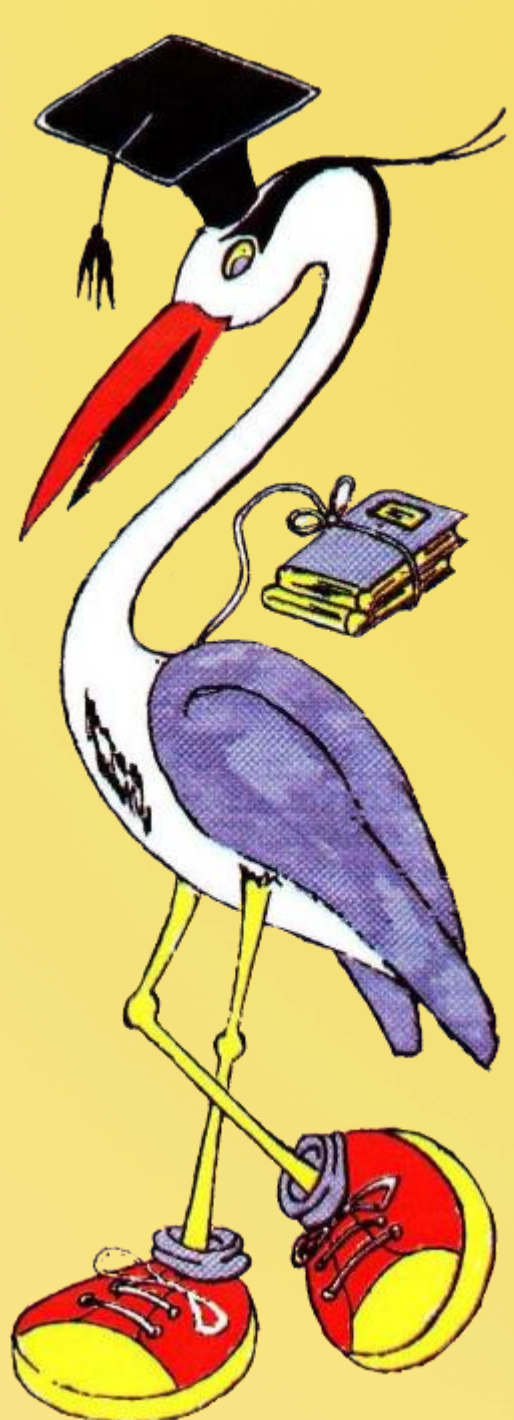
- To have a shadow(s) we need a source(s) of light(s) in front of an object
- To have a silhouette we need an intense source of light behind the object we are photographing → silhouette looks like a shadow
- To have a stereographic projection we need a source of light inside a sphere → stereographic projection is a result of a shadow

Only for orthographic projection, we don't need any special conditions except stereoscopic vision and depth perception.

A bit of wisdom:

„Turn your face to the sun and the shadows fall behind you.”

Maori Proverb



Co-funded by the
Erasmus+ Programme
of the European Union

