# GEOMETRICIAN'S VIEWS

## TOPIC: POLYHEDRA

### MATHEMATICAL VIEW

Using the 3D printer to produce solids models of mathematical objects is a worthwhile educational activity focused both on computing and mathematical skills. Platonic solids offer a unique opportunity to study Euclidean 3D geometry. Mathematicians and aritsts have been fascinated by those solids since antiquity. Euler's formula, giving the relationship among total number of vertices ($V$), edges ($E$), and faces ($F$) ($V - E + F = 2$), allowed students to understand an interesting mathematical proof.

Researcher
Simone Pacetti
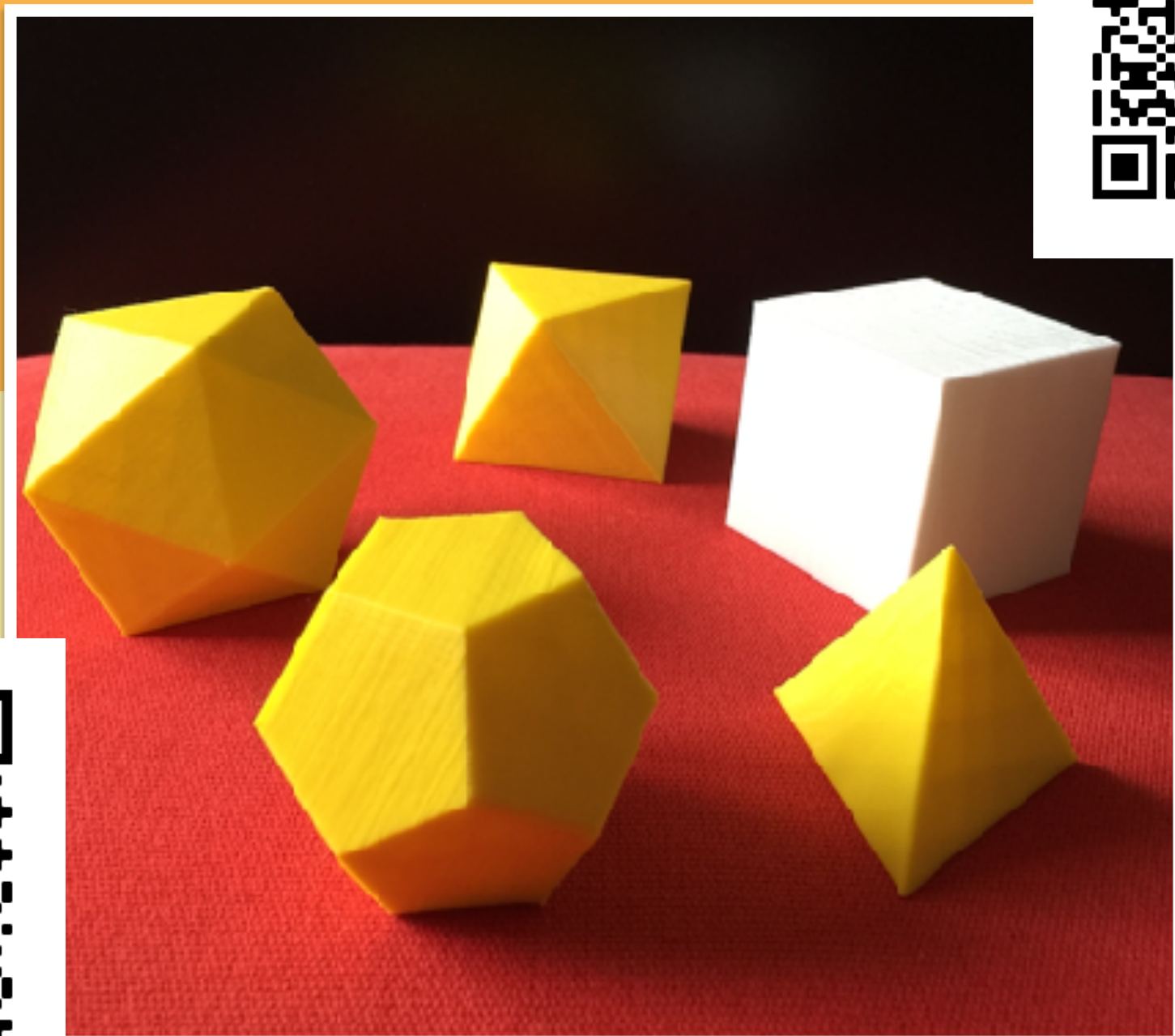
### ARTISTIC VIEW

Art as an expression of reality through pure geometric shapes.

*"Treat nature by means of the cylinder, the sphere, the cone, everything brought into proper perspective so that each side of an object or a plane is directed toward a central point."*

Paul Cézanne

Artist
Leonello Proietti



Leonello Proietti
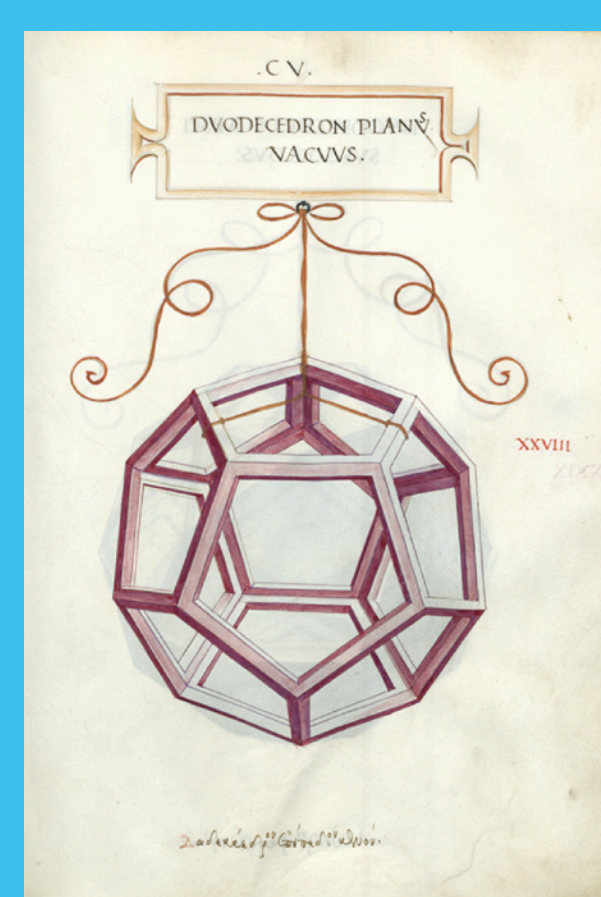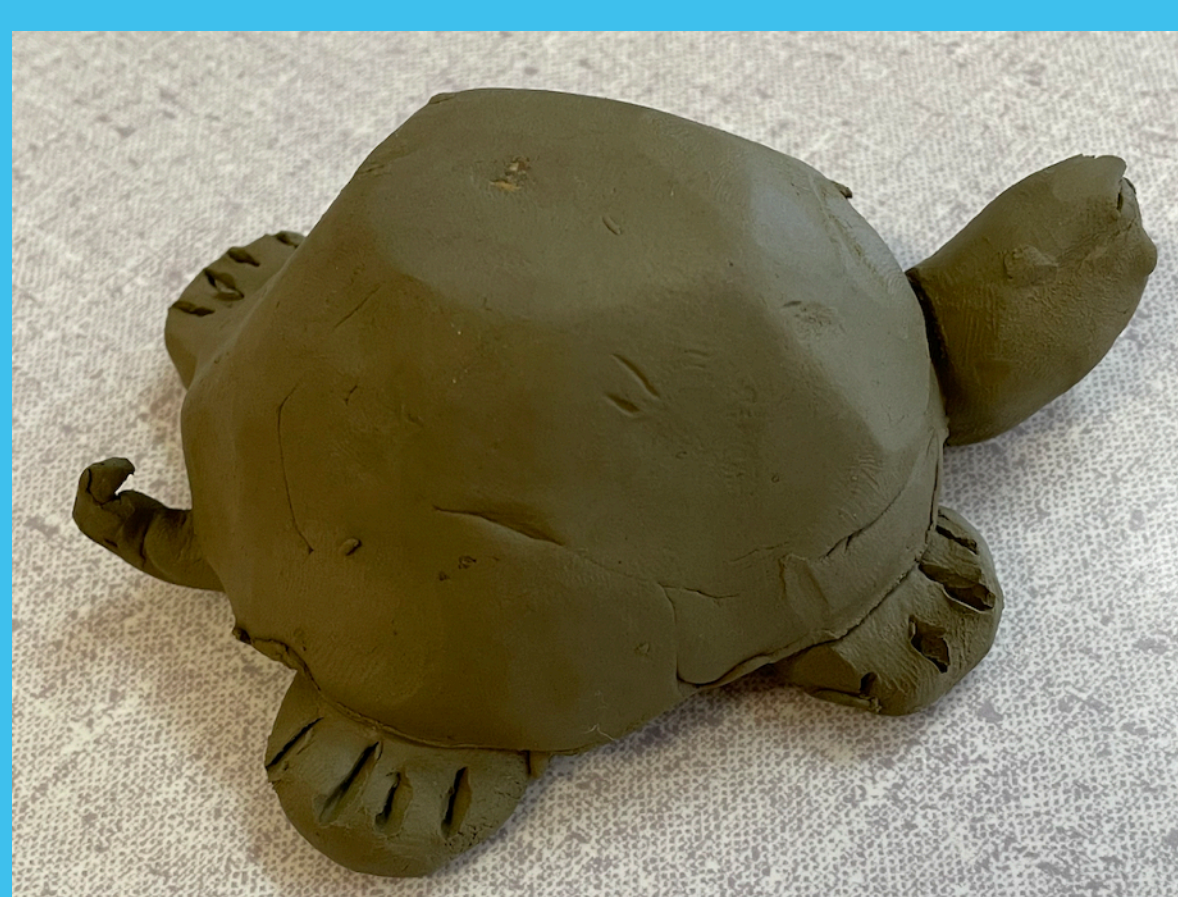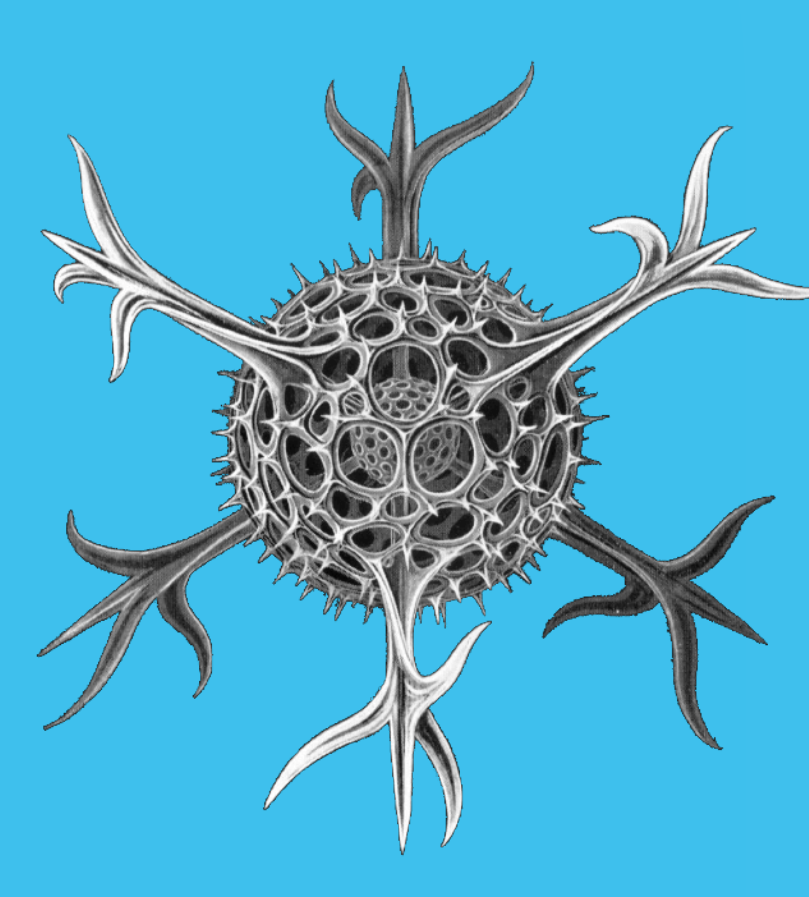
## COMMON VIEW



Image 1                    Image 2

Harold Scott MacDonald Coxeter, a British and Canadian mathematician, said that one reason to study regular polyhedra is the same that prompted Pythagoreans to study them: their symmetrical forms, which are linked to our artistic sense. Polyhedra are often recognizable in natural shapes, like, for instance, mineral crystals or radiolarian skeleton. They are widespread in art, many examples can be used for educational purposes. Leonardo da Vinci drawings for Luca Pacioli's book "The divine proportion", "Melancholia I" by Albrecht Durer, hidden models of star polyhedra recognizable in the "Sagrada Família" by Antoni Gaudí are just a few examples of how polyhedra are widespread in artworks. The mathematical beauty of polyhedra becomes a perfect subject for artistic production.

*"The mathematician's patterns, like the painter's or the poet's must be beautiful; the ideas like the colours or the words, must fit together in a harmonious way. Beauty is the first test: there is no permanent place in the world for ugly mathematics."*

Image 1                                                    Image 2

G.H. Hardy, A Mathematician's Apology

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