

Non-traditional approaches to the selected stereometric problems through DGS

Katarína Žilková and Dušan Vallo

*Comenius University in Bratislava and Constantine the Philosopher University in Nitra,
Slovakia*

Mathematical education through the dynamic geometry systems provides a new dimension for teachers and students. The creation of an experimental interactive and dynamic environment enables the teaching of mathematics based on a personal experience, practice and in many cases on non-traditional approaches to the solution of geometric tasks.

A new perspective on visualization of geometric duality principle of regular polyhedra has been shown during creating animated interactive models in Cabri 3D, as described in the article. In spite of the theoretical difficulty of general duality principle it is possible to discover and illustrate its basic attributes in an easy way, e.g. regular solids duality can also grasp students of higher secondary education or future teachers of mathematics at university level. A new perspective on the above mentioned issue can be achieved through geometric interpretation in DGS. Simplified interpretation of geometric fundamentals of traditional dual solid construction (e.g. a regular octahedron) to the regular solid (a cube) consists of the face midpoints construction of the given regular solid (the cube). The face points become the vertices of the given dual solid. If we want to show the reverse duality we can use the tools of animation in DGS and visualize the process of the regular octahedron penetration to the cube and vice versa. This issue involves the discovery of other geometric relations between the mentioned mutually dual solids.

We will provide reasons for a sphere volume computation formula according to the Cavalieri's Principle. The geometric principle will be confronted with the Archimedean reasoning of the given formula. Furthermore, we will use the graphic potentiality of the Cabri 3D software again to visualize the problem.