

Good practices PROG_207BCD_EN

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Description of the problem / exercise: **Poly-Universe and GeoGebra — Poly-Universe in 3D**

The 3D extension of the triangle element is naturally the tetrahedron, and the square element is the cube. The enlargement from point in GeoGebra also applies to spatial shapes, so editing is easy and can be done in a few steps. For the tetrahedron in Figure 1, the ratio remained the traditional $\frac{1}{2}$, but for the cube we used the ratio of the golden ratio. Of course, the base element can be colored, but in the figure the base element has been made with an edge structure for better visibility.

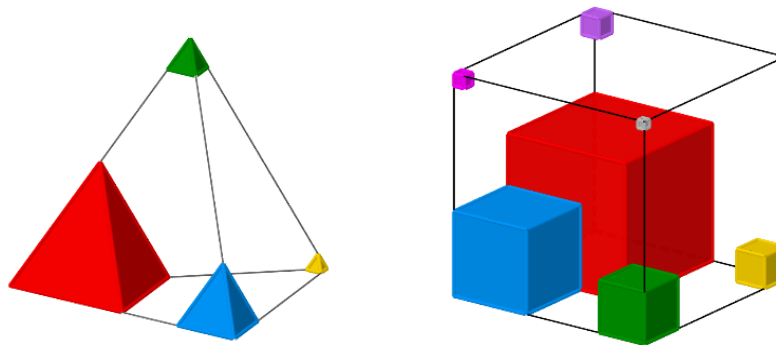


Figure 1

You can also experiment with variable ratios on the slider in the two polyhedron-based cases. Figure 2 shows the tetrahedron-based construction with a negative ratio less than -1 and a positive ratio greater than 1 . We can also formulate relations for the volume of similar solids, read the volume of the polyhedra in the algebra window, and study the properties of the enlargement from point in space.

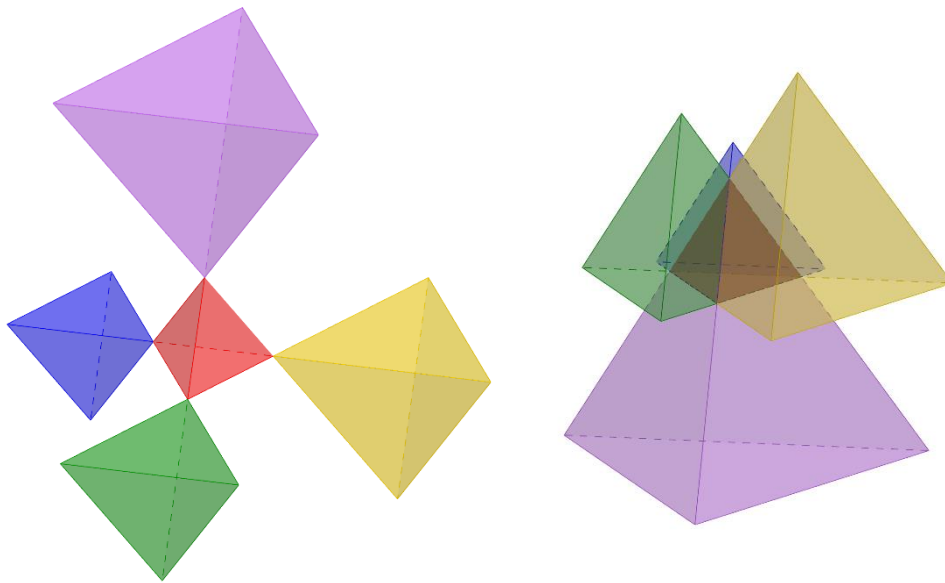


Figure 2

Figure 3 shows a negative proportional similarity of the cube and an interesting projection of the cube with a positive proportional similarity.

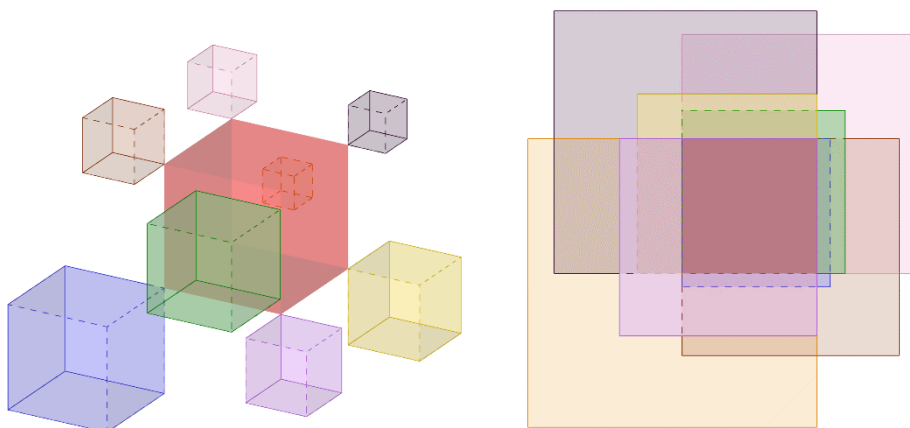


Figure 3

<https://www.geogebra.org/classic/j3mhcpd7>

<https://www.geogebra.org/classic/e4tw78hq>

- *Why this exercise is good:* It helps to develop spatial seeing.
- *Which level is recommended:* Upper primary school, secondary school, teacher training (mathematics, IT)
- *School subject(s):* Mathematics, IT, arts