

ZMATH 2015c.00712

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A case study on high school students' mental image in the process of solving regular polyhedron problems.

J. Korean Soc. Math. Educ., Ser. A, Math. Educ. 53, No. 4, 493-507 (2014).

Summary: The purpose of this study is to analyze how high school students form and interpret the mental image in the process of solving regular polyhedra problems. For this purpose, a set of problems about a regular polyhedron's vertex is developed on the base of a regular polyhedron's duality and circulation and applied to 2 students of the 12th graders of a high school. After 2 hours of teaching and learning and another 2 hours of mental image-analysis process, the following research findings are obtained. First, the student who recorded medium high-level grade in the national scholastic test can build the dynamic image or the pattern image in the process of solving regular polyhedra vertex problems by utilizing a 3D geometry program. However, the other student who recorded low-level grade can built a concrete-pictorial image. Second, pattern image or dynamic image can help students solving regular polyhedron vertex problems by proper transformation of informations and mental images while the concrete-pictorial image does not help. Hence, it is recommended that mathematics teachers should develop teaching and learning materials about regular polyhedra's duality and circulation and also give students suitable questions to build the various mental images.

Classification: G44 C34 G24 U74

Keywords: regular polyhedron; mental image; dynamic geometric program