

# My Favorite Origamics Lesson on the Volume of Solids

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Origamics is the term introduced by Kazuo Haga to label the branch of study connecting origami and mathematics. I am a mathematics lecturer doing teacher education in Hong Kong. In this paper I would like to share with readers my favorite 3-hour origamics lecture design on the use of origami in motivating students to learn geometry.

Two mathematics-rich problems are discussed. They are

- The volume of origami boxes

Models of a rectangle box folded from a single sheet of paper are abundant. If we fold them with the same size paper, which model yields the maximum volume? With the same folding method and the area of the paper kept constant, what will happen to the volume when the side lengths vary? As Higginson & Colgan said, ‘after exploration students will never look at a piece of paper in the same way again’.

- The solid twins: ck-octahedron and the kc-heptahedron.

This problem is designed by Ka-Luen Cheung and me. Both solids are portions of cube dissections. In the past two years we have developed a number of learning activities in examining their geometric properties. Focus here will be on a way finding the volume of these solids similar to Liu Hui’s (an ancient Chinese mathematician) Yangma method.

Depending on the activity design and the depth of mathematics covered, these problems can be used in geometry classrooms at different levels, ranging from upper primary (10 years old) to senior secondary (17 years old). Besides origami, dynamic geometry software (DGS) is also used throughout the lecture. Its functions, particularly the handling of proof in mathematics, will be discussed.

## Reference

Shen Kangsheung et.al.(1999). *The nine chapters on the mathematical art: companion and commentary*. Oxford University Press.

