

Constructing Pyramids with Simple Folds

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Abstract

Folding can provide very interesting and accessible ways to obtain simple to quite complex polyhedra constructed from a single sheet of paper. In this paper I discuss some simple examples from a teacher's perspective, concentrating on constructing pyramids and pyramid based solids from square, pentagon etc. For each I give a set of related problems and some ideas for further discussion and areas of exploration with students.

Basically nothing else than paper and a few simple folds are needed. It is not entirely origami as the use of glue may be necessary in the end if we want to produce stable solids, but folding remains the essential part of the process.

Folding can serve as a good method enhancing understanding of different areas of solid geometry, especially for schools which are not wealthy enough to possess more expensive building kits. Among other main advantages it offers, it enables profound learning during the construction process and later while discussing the properties of the folded solid, such as the connection between the volume and the surface of the solid, but also the starting shape of the sheet and its surface. Aspects such as the efficiency of the design, comparison of the volume, the surface and the weight of the final solid, ease of construction and other properties provide further opportunities for discussion. There is a wide range of problems which can be formulated once the solid is built (with or without glue). Discussion can also focus around recognizing the main advantages and disadvantages of some designs and choosing a preferred solution under given constraints.

Another important factor is that different aspects can be of interest for different groups of students depending on their prior skills, their professional orientation or individual interests. Finally, the folded solids themselves can be used in art and design classes as well, but also as a simple decoration for various events. Thus folding offers the teacher many opportunities to adapt the proposed material to the level of their students and the pedagogic goal.

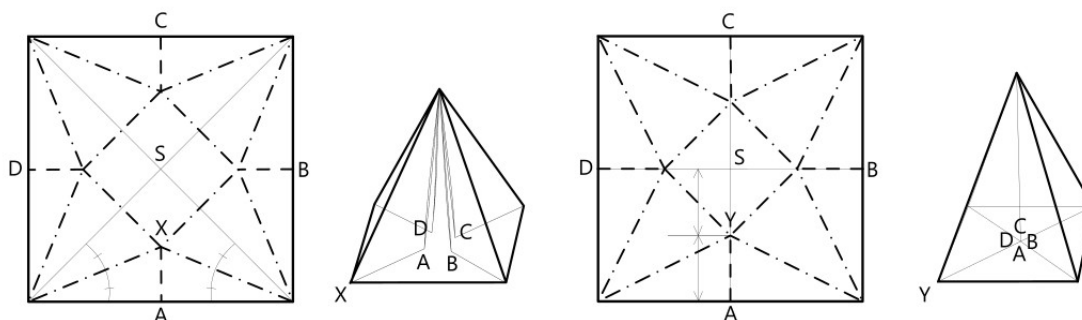


Figure 1. Comparison of two folded pyramids. In the ideal case for second pyramid all the points A, B, C and D meet in the same place. (Details of construction and comparison of more properties are further detailed in the paper.)