

Variations on a Theorem of Haga

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Many authors have studied the problem of dividing the side of a square (or rectangular) piece of paper into equal parts via origami methods. While some methods are specific for one ratio only, others, such as the Fujimoto approximation, give more general answers.

In its original form, Haga's theorem provides a simple way to divide the side of a square into thirds; its proof relies upon the Pythagorean theorem, triangle similarity, and first degree equations, which makes it accessible to middle school students. The obvious generalization of Haga's theorem to other divisions needs only an additional (yet easy) algebraic manipulation.

We present here two algorithms, both based on Haga's theorem, for dividing the side of a square into n equal parts and we compare them, discussing their pros and cons. Their connection with the base-two representation of n , its polynomial form, the Horner algorithm and other mathematical issues, make this topic an interesting one for a high school or college activity.