

E1-39: An extension of the field of origami constructible numbers

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We extend the upper bound of the field of constructible totally real numbers by exploiting the theorem given by Auckly & Cleveland (1995), i.e. the set of all origami constructible numbers except those on some trisections is totally real and closed under the operation $(1+\square^{1/3})^{1/2}$.

Definition: An algebraic real number α is said to be constructible by origami, if it is possible to construct a line segment with the length $|\alpha|$ by a finite sequence of origami folding methods starting with 2 given points.

Theorem: The set of all origami constructible numbers is contained in an algebraic extension of degree $2^k \cdot 3^l, k, l = 1 \dots n$ over the field of totally real numbers.

Corollary: $(1+2^{1/4})^{1/2}$ is algebraic of degree 2 over the field of totally real numbers so it is possible to construct a right triangle with hypotenuse $(2+2^{1/2})^{1/2}$ and leg 1 by origami.