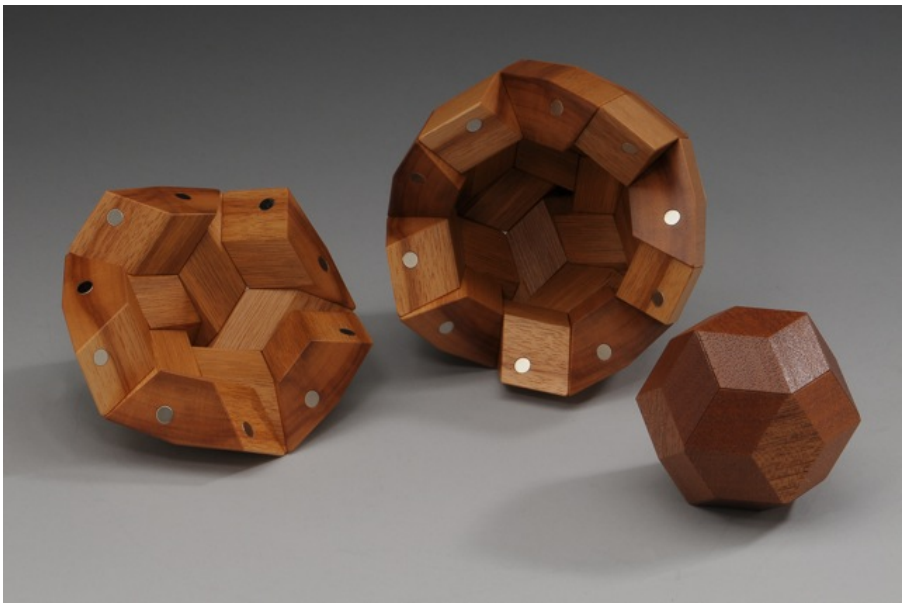
Quintetra Blocks

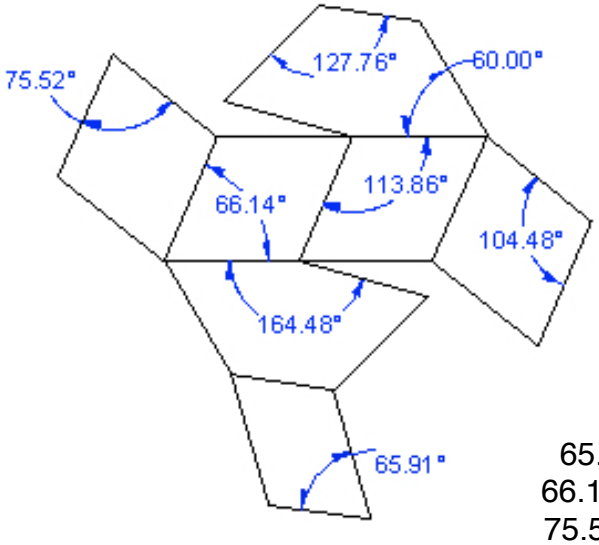
by John and Jane Kostick
www.kosticks.com

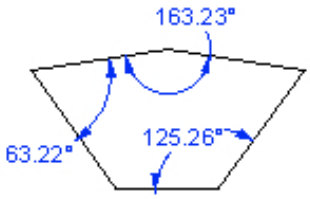
Connected by embedded magnets, thirty of these identically shaped blocks surround a hollow center, into which can fit a wooden triacontahedron.



photography by Dean Powell

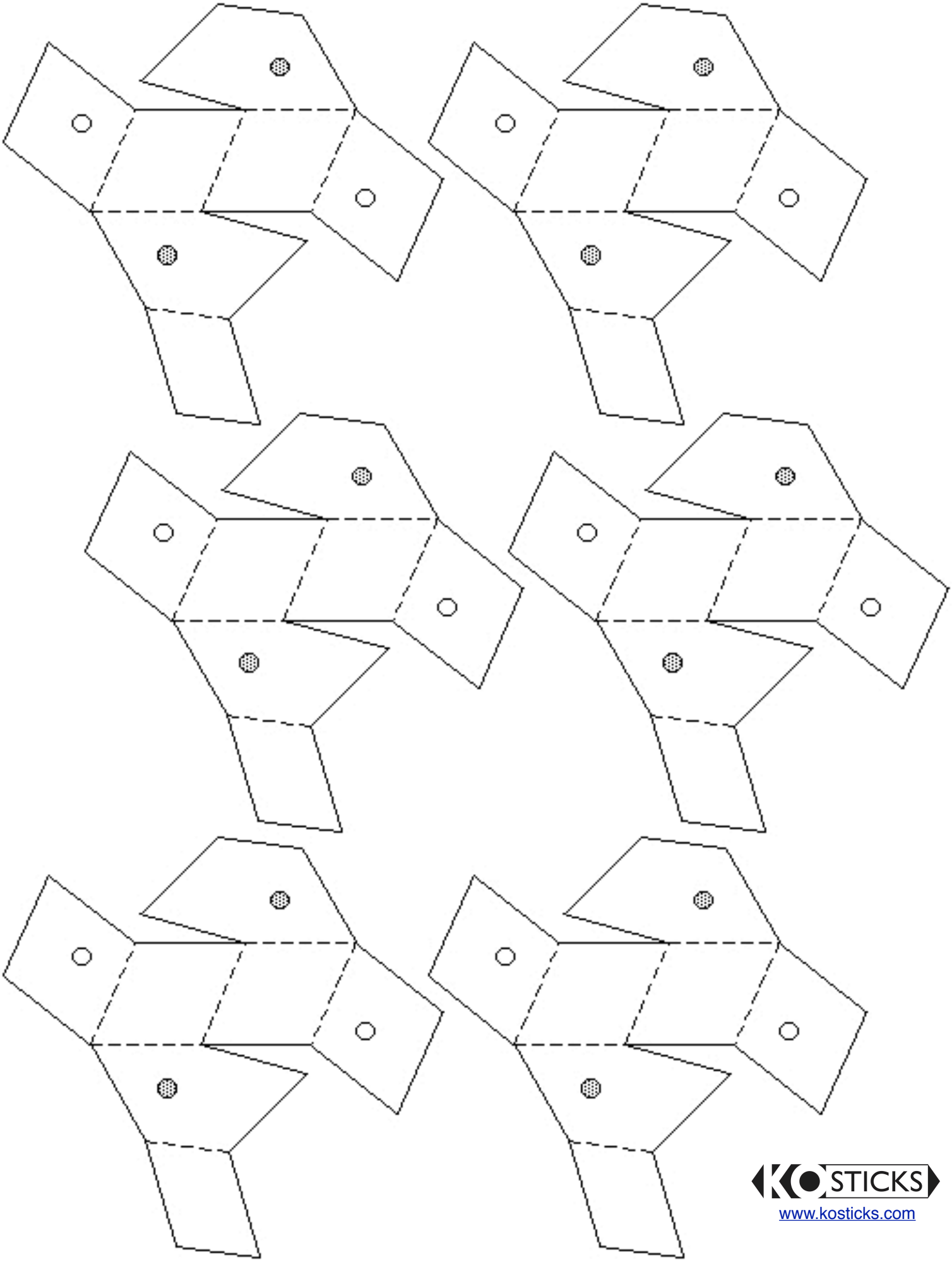
The diagram below to the left shows the face angles on each block. To the right some of the dihedral angles are labeled.





$65.91^\circ = \tan^{-1}\sqrt{5}$
$66.14^\circ = \cos^{-1}(\phi/4)$
$75.52^\circ = \cos^{-1}(1/4)$
$125.26^\circ = \tan^{-1}(-\sqrt{2})$

To make a set of 30 blocks out of paper, print the following page five times. Then cut on the solid lines and fold on the dotted lines. Glue or tape the blocks together so that the dark circles connect to the light circles.



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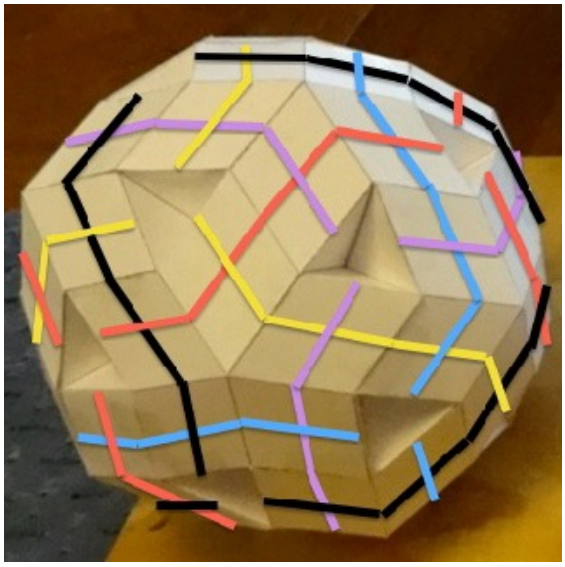
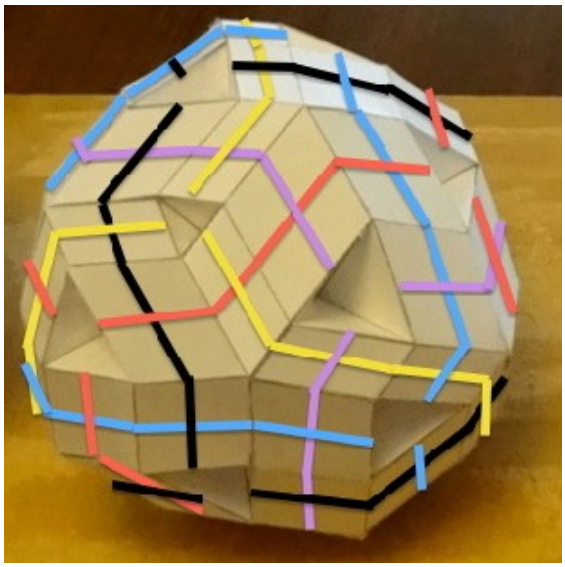
Modulating Lengths

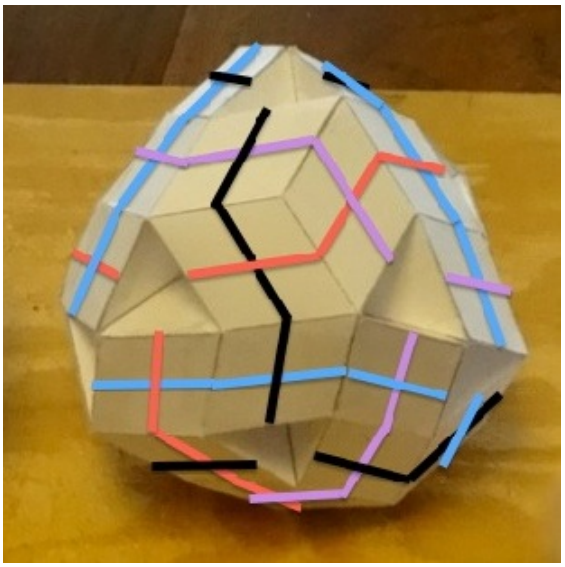
In this picture the assembled shape is annotated in five colors showing five sets of 24 line segments, each set connecting four indented tetrahedral spaces.



Each color traverses a path which crosses line segments that are in parallel with the edges of the four indented tetrahedrons.

Any set of line segments crossed by a given color, as well as the set of four indented tetrahedrons associated with that color, can be independently modulated to any length, including zero. For example, illustrated below, all of parallelograms that the yellow lines traverse are made narrower, which shrinks the connecting tetrahedrons.





By modulating any or all of the five sets, countless variations of this polyhedron can be made out of equilateral triangles and 113.86º parallelograms.