PLANAR PROPERTIES

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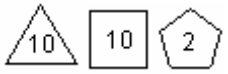
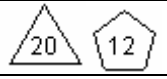
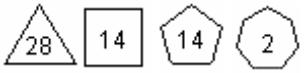
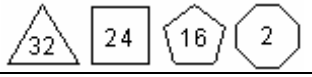
This article is about planar modular origami only and does not include the spirals. The properties are interesting and assist in model assembly.

- Every plane passes through the center of the model.
- Every plane intersects every other plane.
- If a planar is of degree *n*, i.e., there are *n* planes, then the polygonal nature of the planes is of degree *(n-1)*.
- Total number of units, $U = n(n-1)$.
- Angle at the base of the units, $\theta = 360/(n-1)$.
- Sum of number of sides of all facial polygons, $\Sigma S = 4U$.

The table below lists the properties of the various planars.

Model Name	Number of Planes (n)	Nature of Planes (n-1)° Polygon	Total # of Units U = n(n-1)	Base Angle θ = 360/(n-1)°	Underlying Polyhedron	Facial Polygons Or Rings	Sum Sides ΣS = 4U
XYZ (Cartesian Planes)	3	Digonal (2)	3x2 = 6	360/2 = 180°	Octahedron		24
WXYZ	4	Triangular (3)	4x3 = 12	360/3 = 120°	Cuboctahedron		24+24 = 48
VWXYZ	5	Quadrilateral (4)	5x4 = 20	360/4 = 90°	Pentagonal Gyrobicupola J31		30+40+10 = 80
UVWXYZ	6	Pentagonal (5)	6x5 = 30	360/5 = 72°	Icosidodecahedron		60+60 = 120
TUVWXYZ	7	Hexagonal (6)	7x6 = 42	360/6 = 60°	No formal name*		84+60+24 = 168
STUVWXYZ	8	Heptagonal (7)	8x7 = 56	360/7 = 51.4°	No formal name*		84+56+70 +14 = 224
RSTUVWXYZ	9	Octagonal (8)	9x8 = 72	360/8 = 45°	No formal name*		96+96+80 +16 = 288
QRSTUVWXYZ	10	Nanogonal (9)	10x9 = 90	360/9 = 40°	Truncated Icosahedron-like		180+60+120 = 360

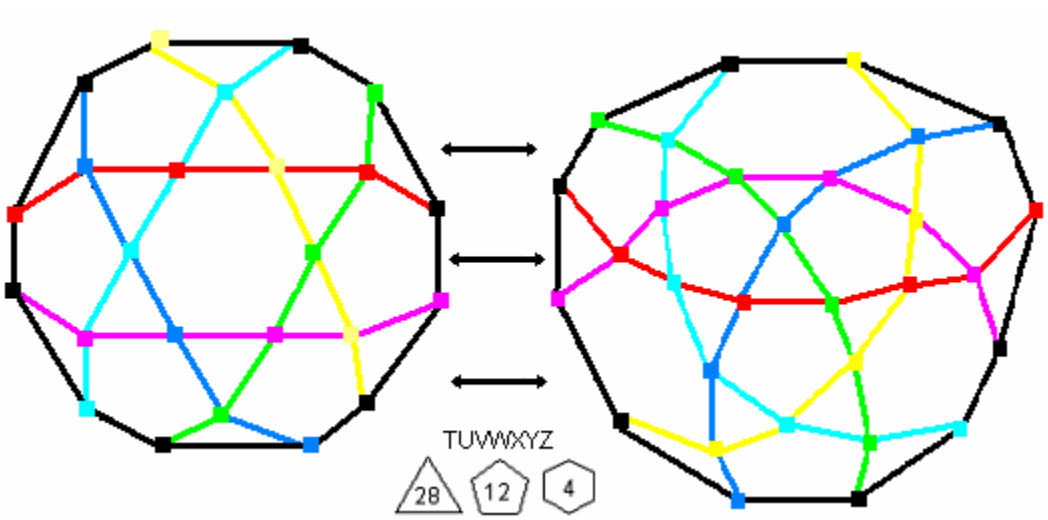
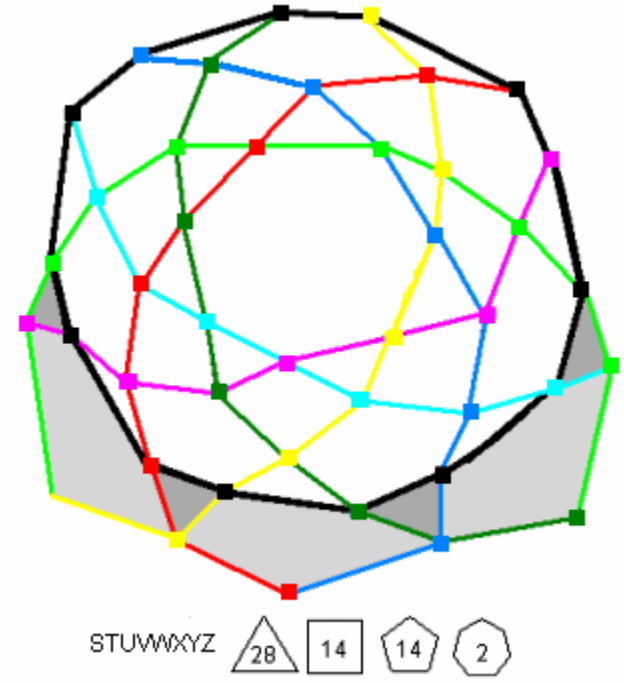
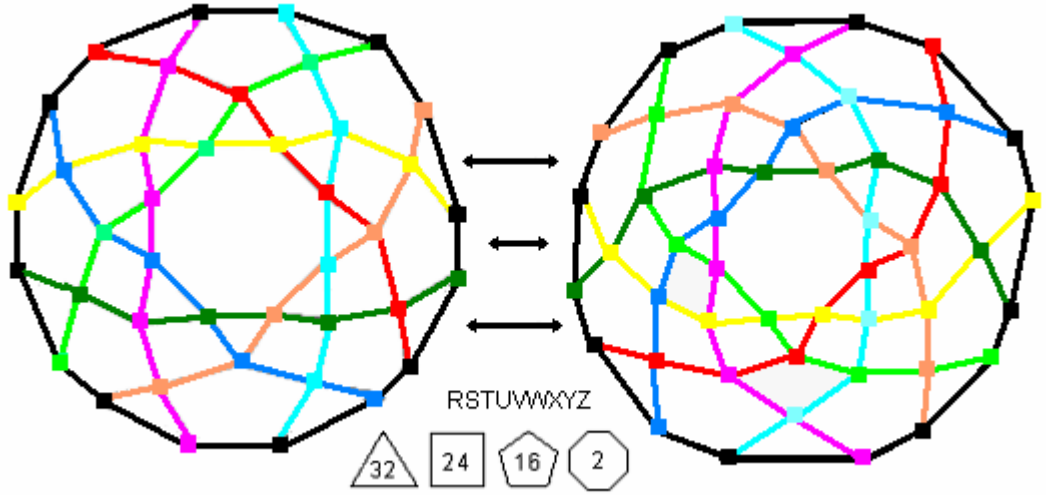
Notes:

- It is best to make each plane in one colour to emphasize the planes and also for ease of assembly.
- As *n* grows larger, θ should be made a degree or two smaller than the theoretical value above, to accommodate for the paper thickness.

* Please refer to assembly guide on next page.

ASSEMBLY GUIDE FOR PLANARS BASED ON UNCONVENTIONAL POLYHEDRA

The diagrams here are schematic and not to scale. The models are cut into two hemispheres, the black ring representing the equator.

A square dot with two arms ( ) represents a unit. Due to the abstract nature of the diagrams, a unit may not always appear as a straight line.

For the models TUVWXYZ and RSTUVWXYZ, the halves are not identical, so both halves have been shown. For the model STUVWXYZ, the two halves are identical. Part for the other half is shown in gray to illustrate its orientation with respect to the top half.