

The 5 Platonic solids:

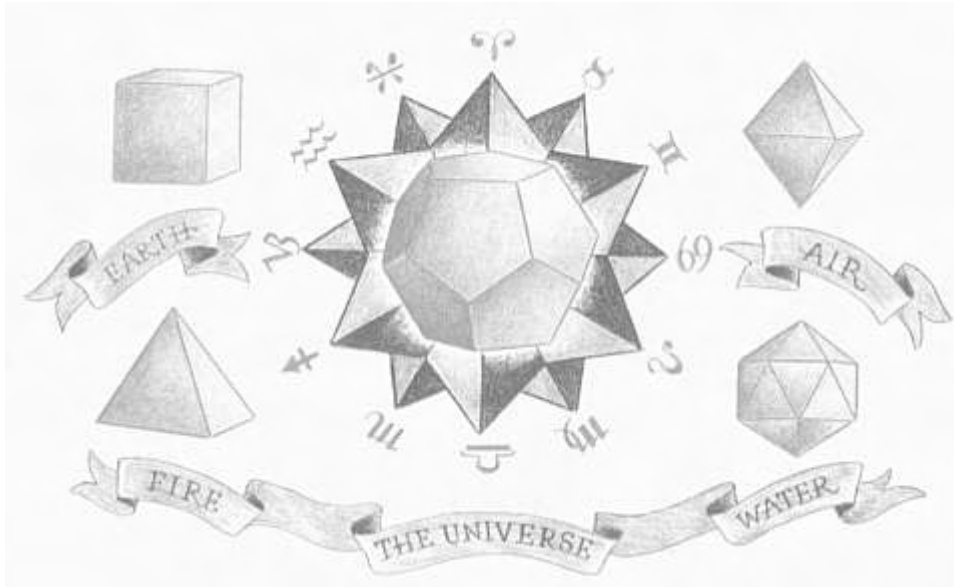
The Tetrahedron (3 equilateral triangles at each vertex)

The Hexahedron (3 squares at each vertex, cube)

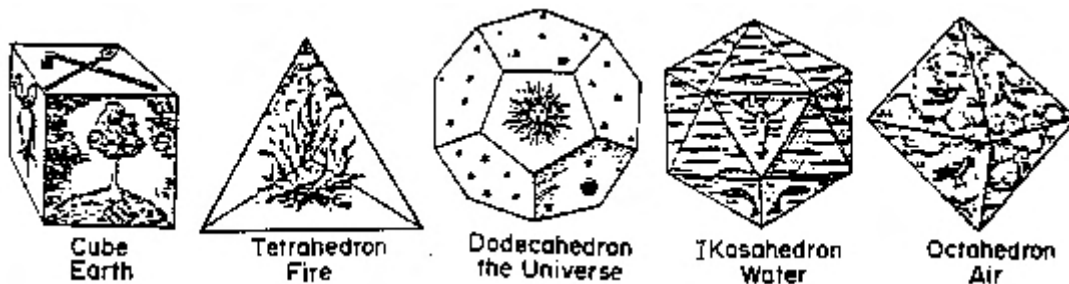
The Octahedron (4 equilateral triangles at each vertex)

The Dodecahedron (3 pentagons at each vertex)

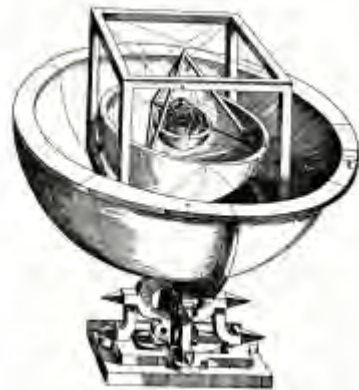
The Icosahedron (5 equilateral triangles at each vertex)



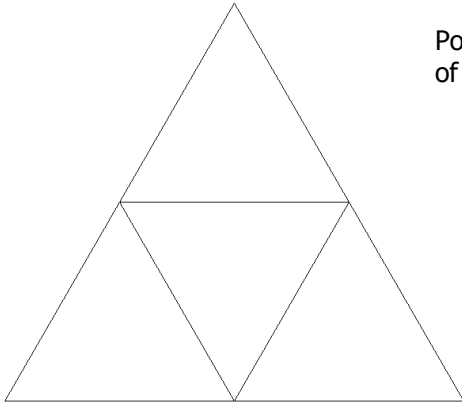
The so-called Platonic Solids are regular polyhedra. "Polyhedra" is a Greek word meaning "many faces." There are five of these, and they are characterized by the fact that each face is a regular polygon, that is, a straight-sided figure with equal sides and equal angles:



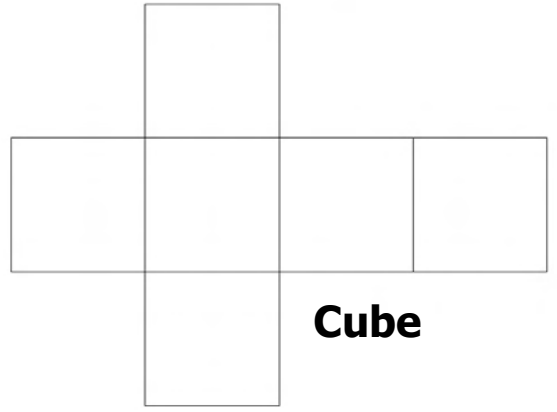
Euclid, 300 BC and the Ancient Greeks, in their inherited love for geometry, called the five solids shown above, the atoms of the Universe. In the same way that we today believe that all matter, is made up of combinations of atoms so the Ancient Greeks also believed that all physical matter is made up of the atoms of the Platonic Solids and that all matter also has a mystical side represented by their connection with earth, air, fire, water and ether.



Poster Board Cut Outs
of Platonic Solids

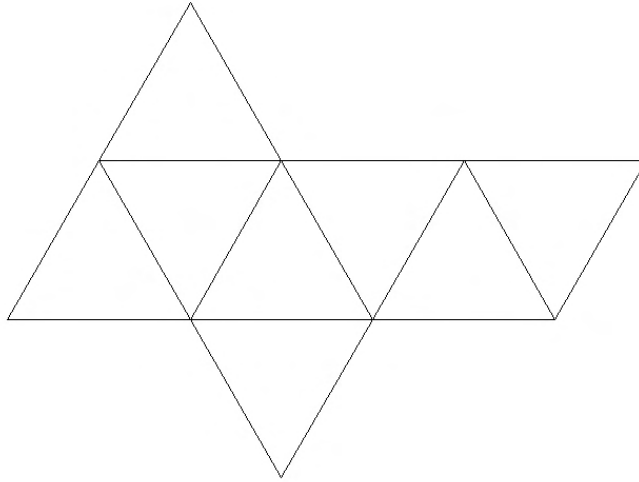


Tetrahedron

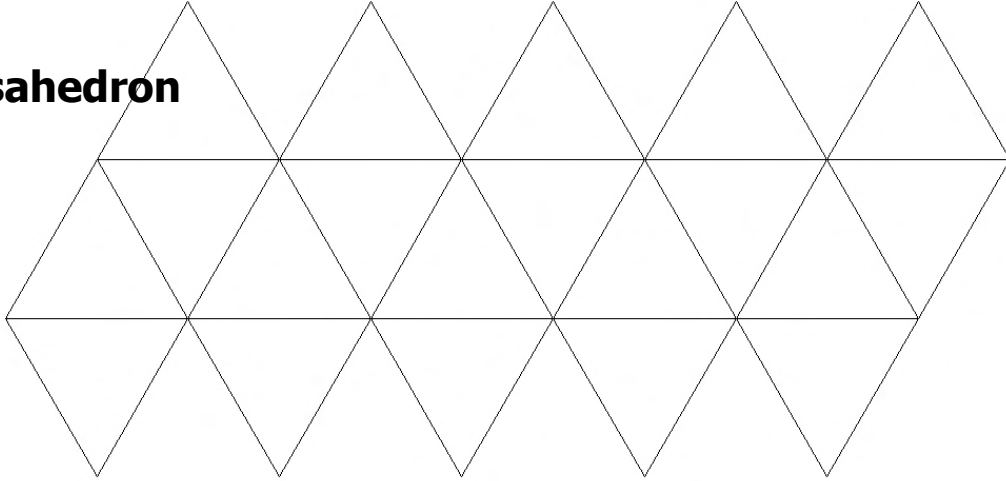


Cube

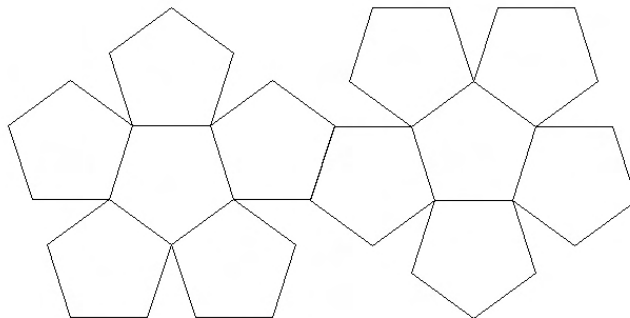
Octahedron



Icosahedron



Dodecahedron



Platonic Solid **TETRAHEDRON**

Deck: Equilateral Triangle

Roof Surface Faces: 3 Equilateral Triangles

Deck Angle = 60°

DD = 30.00000°

SS = 70.52878°

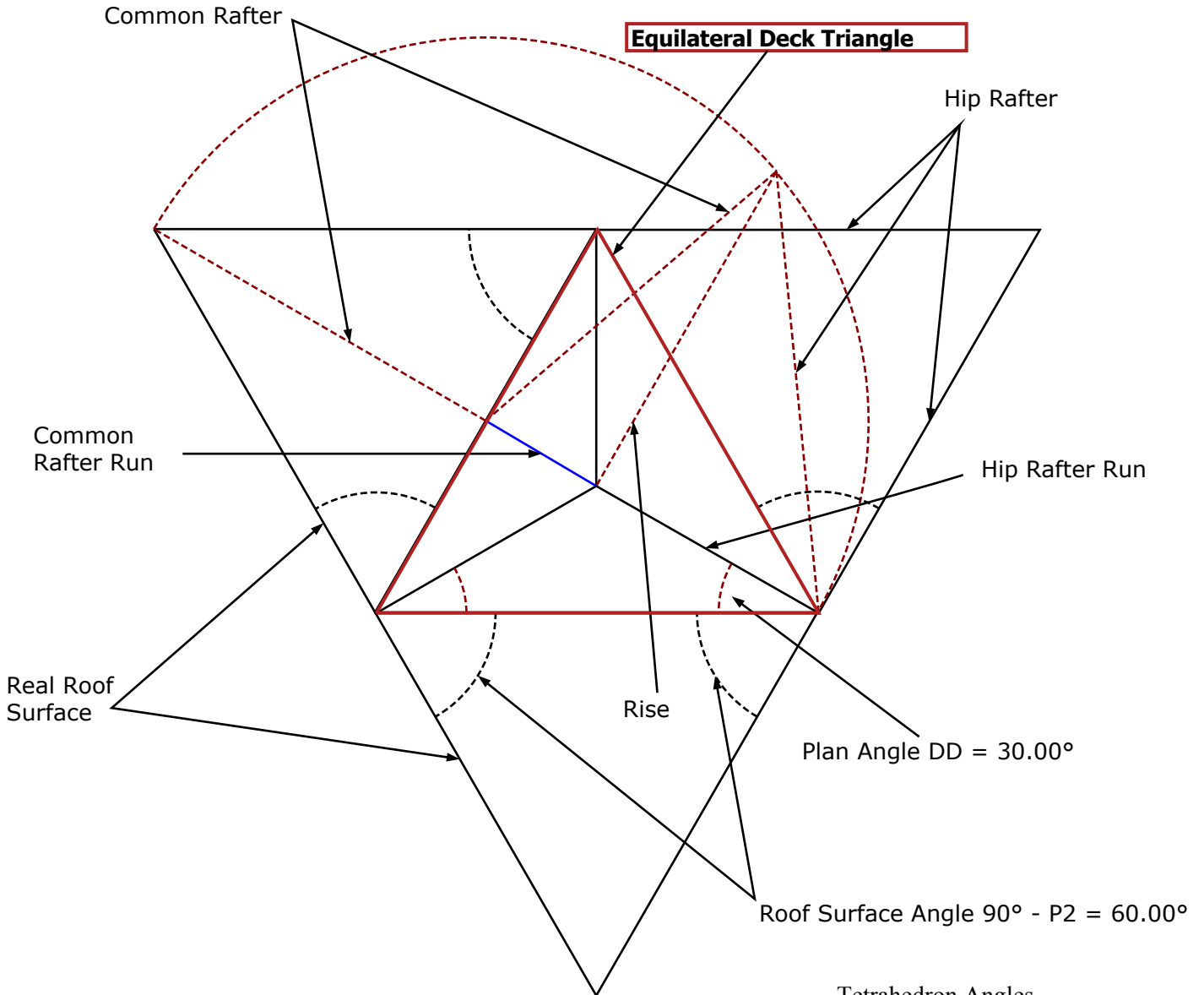
R1 = 54.73561°

90° - P2 = 60.00000°

Edges 6, 4 × Equilateral Triangles

Dihedral Angle Between Faces = 70.53°

Dihedral Angle Between Edges = 60°



Hip Pitch Angle = $\arctan(\tan(\text{Pitch Angle}) * \sin(\text{Plan Angle}))$
 Hip Pitch Angle = $\arctan(\tan(70.52878^\circ) * \sin(30^\circ)) = 54.73561^\circ$
 Hip Backing Angle = $\arctan(\sin(\text{Hip Pitch Angle}) \div \tan(\text{Plan Angle}))$
 Hip Backing Angle = $\arctan(\sin(54.73561^\circ) \div \tan(30^\circ)) = 54.73561^\circ$
 Dihedral Angle = $(90^\circ - \text{Hip Backing Angle}) * 2$
 Dihedral Angle = $(90^\circ - 54.73561) * 2 = 70.52878^\circ$
 Settings for Cutting Hip Rafter Material Laying Flat
 Saw Miter Angle = 54.7356°
 Saw Blade Bevel Angle = 30.0000°
 Settings for Cutting Hip Rafter Material On Edge
 Top Edge of Hip Rafter Saw Miter Angle = 45.000°
 Top Edge of Hip Rafter Saw Blade Bevel Angle = 45.00°

Tetrahedron Angles

D Angle = 30.00000
 A Angle = 70.52878
 C Angle = 54.73561
 E Angle = 30.00000
 B Angle = 54.73561
 90-D Angle = 60.00000
 90-A Angle = 19.47122
 90-C Angle = 35.26439
 90-E Angle = 60.00000
 90-B Angle = 35.26439

Platonic Solid **CUBE**

Deck: Equilateral Triangle

Roof Surface Faces: 3 x Isosceles Triangle

Deck Angle = 60°

SS = 54.73561°

DD = 30°

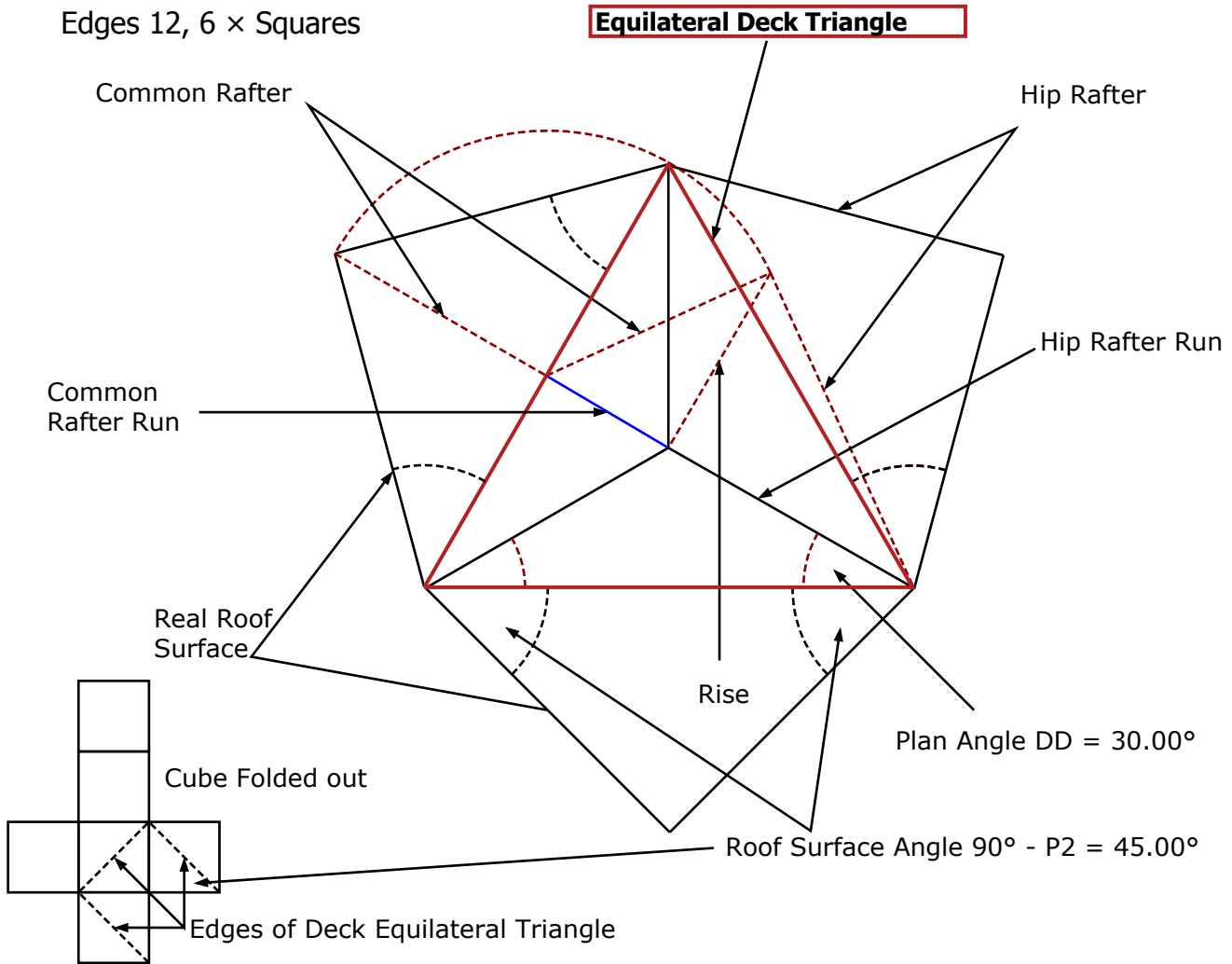
R1 = 35.26439°

90° - P2 = 45.00°

Edges 12, 6 × Squares

Dihedral Angle Between Faces = 90°

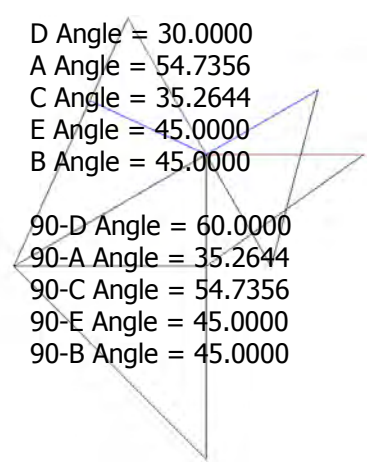
Dihedral Angle Between Edges = 45°



Hip Pitch Angle = $\arctan(\tan(\text{Pitch Angle}) * \sin(\text{Plan Angle}))$
 Hip Pitch Angle = $\arctan(\tan(54.7356^\circ) * \sin(30^\circ)) = 35.2644^\circ$
 Hip Backing Angle = $\arctan(\sin(\text{Hip Pitch Angle}) \div \tan(\text{Plan Angle}))$
 Hip Backing Angle = $\arctan(\sin(35.2644^\circ) \div \tan(30^\circ)) = 45.00^\circ$
 Dihedral Angle = $(90^\circ - \text{Hip Backing Angle}) * 2$
 Dihedral Angle = $(90^\circ - 45.00) * 2 = 90.00^\circ$
 Settings for Cutting Hip Rafter Material Laying Flat
 Saw Miter Angle = 35.2644°
 Saw Blade Bevel Angle = 30.00°
 Settings for Cutting Hip Rafter Material On Edge
 Saw Miter Angle = 35.2644°
 Saw Blade Bevel Angle = 30.00°

Tetrahedron Angles

D Angle = 30.0000
 A Angle = 54.7356
 C Angle = 35.2644
 E Angle = 45.0000
 B Angle = 45.0000
 90-D Angle = 60.0000
 90-A Angle = 35.2644
 90-C Angle = 54.7356
 90-E Angle = 45.0000
 90-B Angle = 45.0000



Platonic Solid **OCTAHEDRON**

Deck: Square

Roof Surface Faces: 4 x Equilateral Triangles

Deck Angle = 90°

DD = 45.00°

SS = 54.73561°

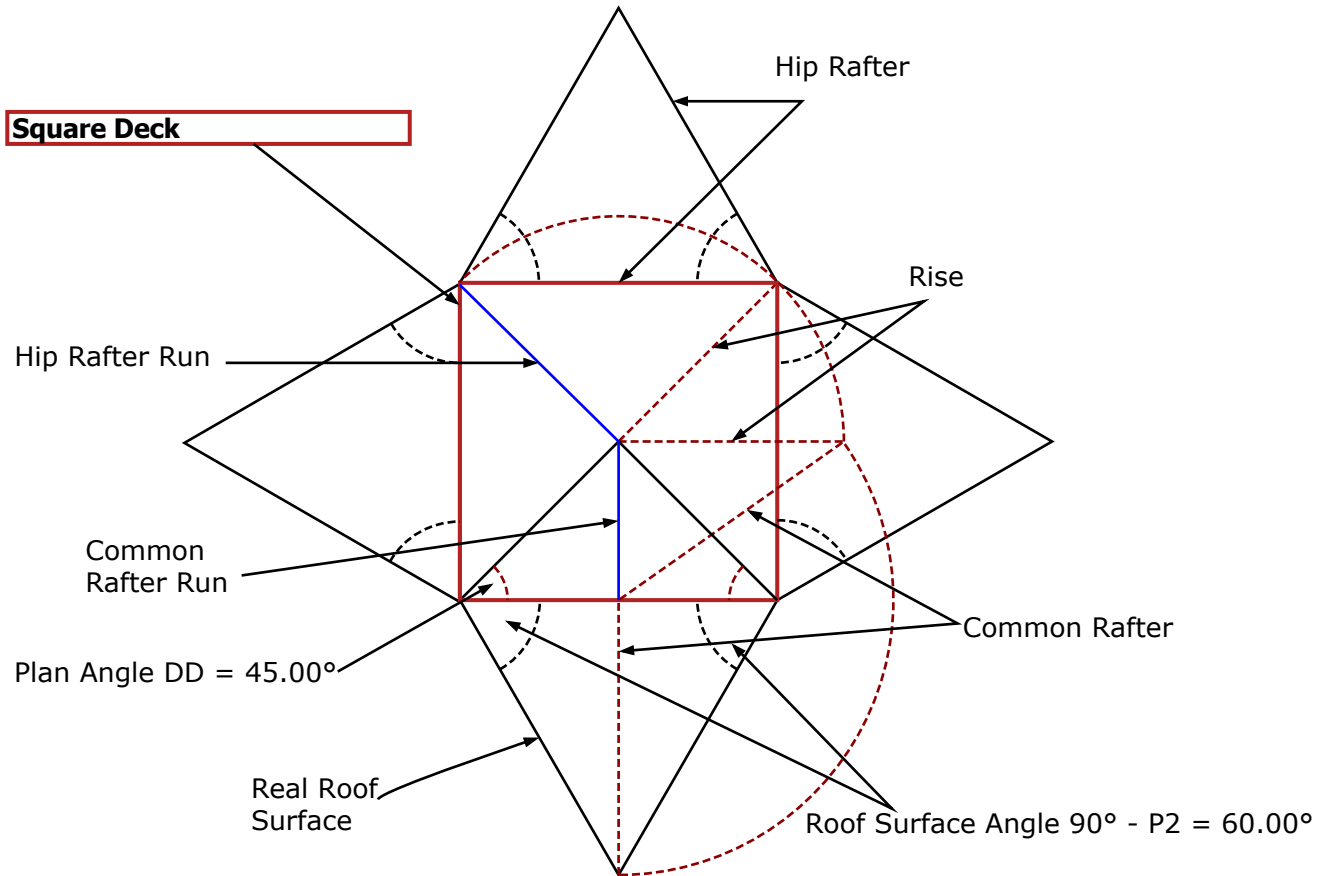
R1 = 45.00°

90° - P2 = 60.00°

Edges 12, 8 x Equilateral Triangles

Dihedral Angle Between Faces = 109.4712°

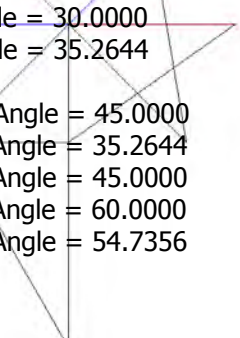
Dihedral Angle Between Edges = 60°



Hip Rafter Pitch Angle = $\arctan(\tan(\text{Pitch Angle}) * \sin(\text{Plan Angle}))$
 Hip Rafter Pitch Angle = $\arctan(\tan(54.73562) * \sin(45.00^\circ)) = 45.00^\circ$
 Hip Rafter Backing Angle = $\arctan(\sin(\text{Hip Rafter Pitch Angle}) \div \tan(\text{Plan Angle}))$
 Hip Rafter Backing Angle = $\arctan(\sin(45.00^\circ) \div \tan(45)) = 35.2644^\circ$
 Hip Rafter Side Cut Angle = $\arctan(\cos(\text{Hip Rafter Pitch Angle}) \div \tan(\text{Plan Angle}))$
 Hip Rafter Side Cut Angle = $\arctan(\cos(45.00) \div \tan(45.00^\circ)) = 35.2644^\circ$
 Dihedral Angle = $(90^\circ - \text{Hip Backing Angle}) * 2$
 Dihedral Angle = $(90^\circ - 35.2644^\circ) * 2 = 119.4712^\circ$
 Settings for Cutting Hip Rafter Material Laying Flat
 Saw Miter Angle = 45.00°
 Saw Blade Bevel Angle = 45.00°
 Settings for Cutting Hip Rafter Material On Edge
 Saw Miter Angle = 54.73562°
 Saw Blade Bevel Angle = 30.00°

Tetrahedron Angles

D Angle = 45.0000
 A Angle = 54.7356
 C Angle = 45.0000
 E Angle = 30.0000
 B Angle = 35.2644
 90-D Angle = 45.0000
 90-A Angle = 35.2644
 90-C Angle = 45.0000
 90-E Angle = 60.0000
 90-B Angle = 54.7356



Platonic Solid ICOSAHEDRON

Deck: Pentagon

Roof Surface Faces: 5 x Equilateral Triangles

Deck Angle = 108°

DD = 54.00°

SS = 37.37737°

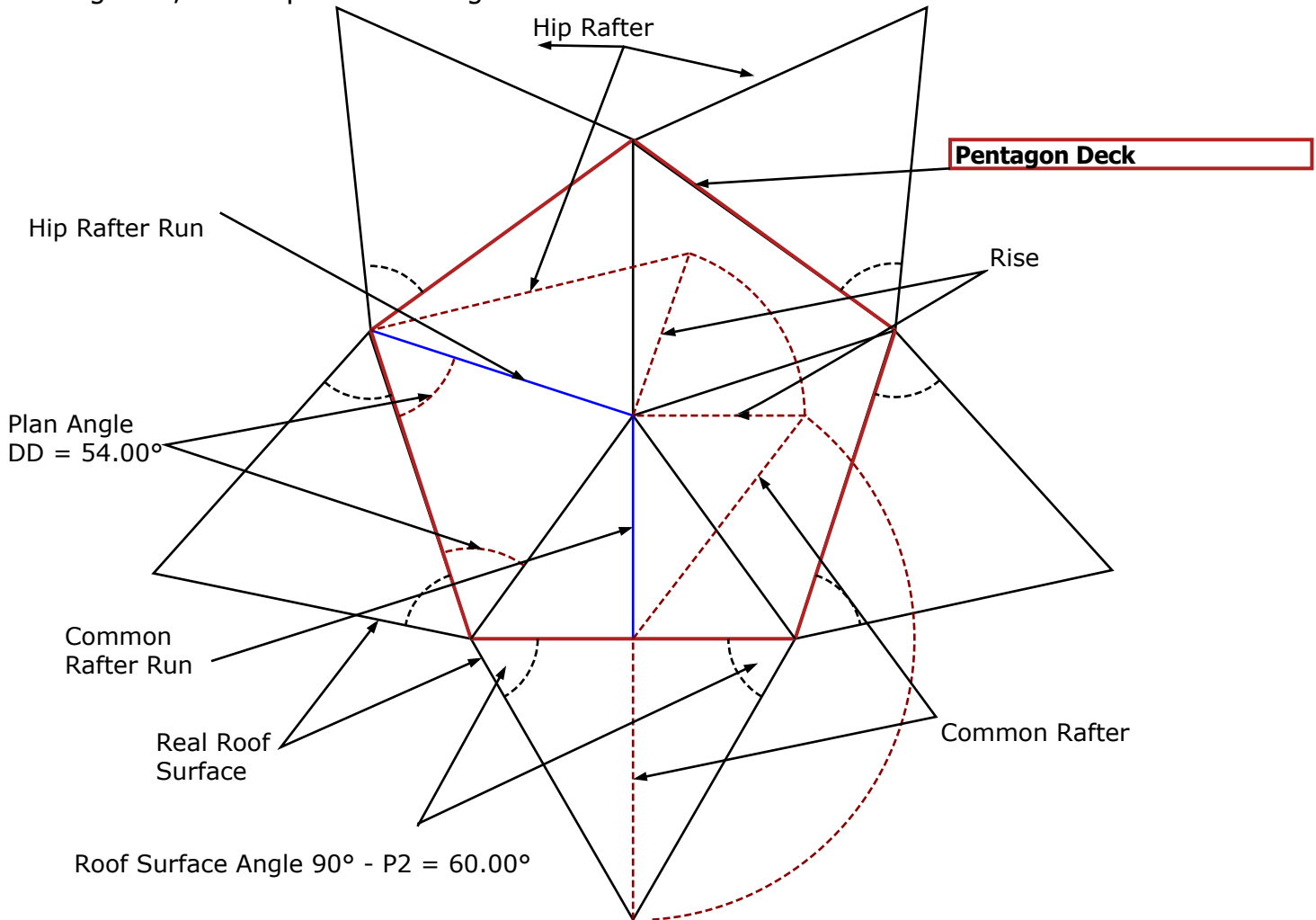
R1 = 31.71747°

90° - P2 = 60.00°

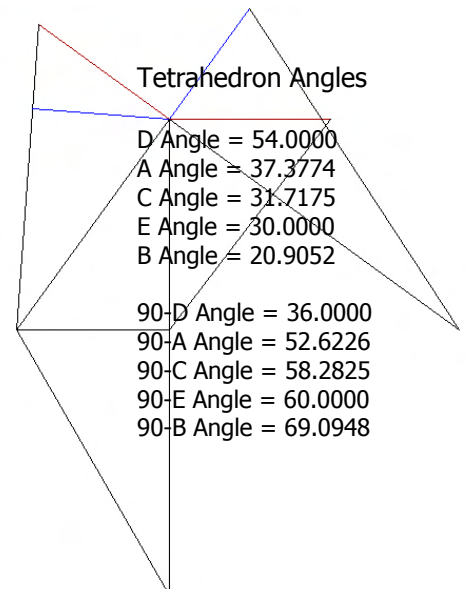
Edges 30, 20 x Equilateral Triangles

Dihedral Angle Between Faces = 138.1897°

Dihedral Angle Between Edges = 60°



Hip Rafter Pitch Angle = $\arctan(\tan(\text{Pitch Angle}) * \sin(\text{Plan Angle}))$
 Hip Rafter Pitch Angle = $\arctan(\tan(37.37737) * \sin(54)) = 31.71747^\circ$
 Hip Rafter Backing Angle = $\arctan(\sin(\text{Hip Rafter Pitch Angle}) \div \tan(\text{Plan Angle}))$
 Hip Rafter Backing Angle = $\arctan(\sin(31.71747) \div \tan(54)) = 20.90516^\circ$
 Hip Rafter Side Cut Angle = $\arctan(\cos(\text{Hip Rafter Pitch Angle}) \div \tan(\text{Plan Angle}))$
 Hip Rafter Side Cut Angle = $\arctan(\cos(31.71747) \div \tan(54)) = 31.71747^\circ$
 Dihedral Angle = $(90^\circ - \text{Hip Backing Angle}) * 2$
 Dihedral Angle = $(90^\circ - 20.90516^\circ) * 2 = 138.1897^\circ$
 Settings for Cutting Hip Rafter Material Laying Flat
 Saw Miter Angle = 31.71747.00°
 Saw Blade Bevel Angle = 54.00°
 Settings for Cutting Hip Rafter Material On Edge
 Saw Miter Angle = 58.2825°
 Saw Blade Bevel Angle = 18.00°



Tetrahedron Angles

D Angle = 54.0000

A Angle = 37.3774

C Angle = 31.7175

E Angle = 30.0000

B Angle = 20.9052

90-D Angle = 36.0000

90-A Angle = 52.6226

90-C Angle = 58.2825

90-E Angle = 60.0000

90-B Angle = 69.0948

Platonic Solid **DODECAHEDRON**

Deck: Equilateral Triangle

Roof Surface Faces: 3 x Isosceles Triangle

Deck Angle = 60°

SS = 37.37737°

DD = 30°

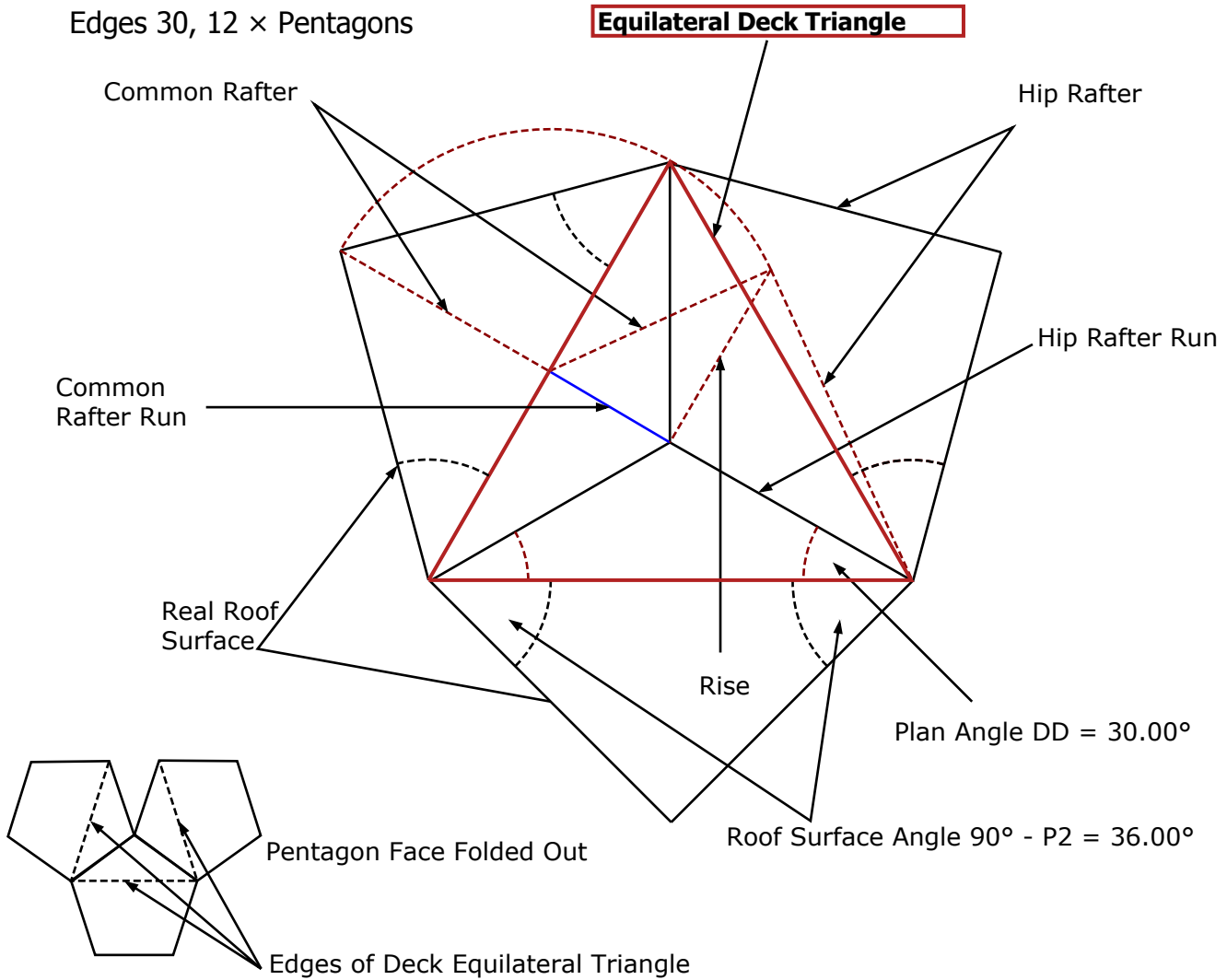
R1 = 20.90516°

90° - P2 = 36.00°

Edges 30, 12 x Pentagons

Dihedral Angle Between Faces = 116.5650°

Dihedral Angle Between Edges = 36°

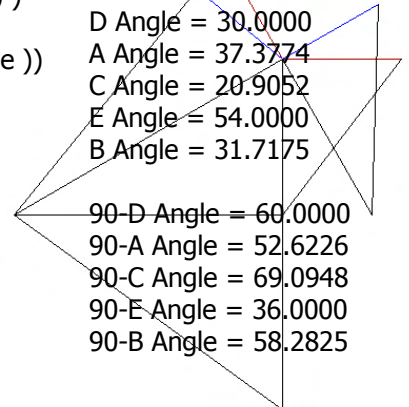


Hip Rafter Pitch Angle = $\arctan(\tan(\text{Pitch Angle}) * \sin(\text{Plan Angle}))$
 Hip Rafter Pitch Angle = $\arctan(\tan(37.37737) * \sin(30)) = 20.90516^\circ$
 Hip Rafter Backing Angle = $\arctan(\sin(\text{Hip Rafter Pitch Angle}) \div \tan(\text{Plan Angle}))$
 Hip Rafter Backing Angle = $\arctan(\sin(20.90516) \div \tan(30)) = 31.71747^\circ$
 Hip Rafter Side Cut Angle = $\arctan(\cos(\text{Hip Rafter Pitch Angle}) \div \tan(\text{Plan Angle}))$
 Hip Rafter Side Cut Angle = $\arctan(\cos(20.90516) \div \tan(30)) = 58.28252^\circ$
 Dihedral Angle = $(90^\circ - \text{Hip Backing Angle}) * 2$
 Dihedral Angle = $(90^\circ - 31.71747) * 2 = 116.5650^\circ$
 Settings for Cutting Hip Rafter Material Laying Flat
 Saw Miter Angle = 20.90516°
 Saw Blade Bevel Angle = 30.00°
 Settings for Cutting Hip Rafter Material On Edge
 Saw Miter Angle = 31.71747°
 Saw Blade Bevel Angle = 18.00°

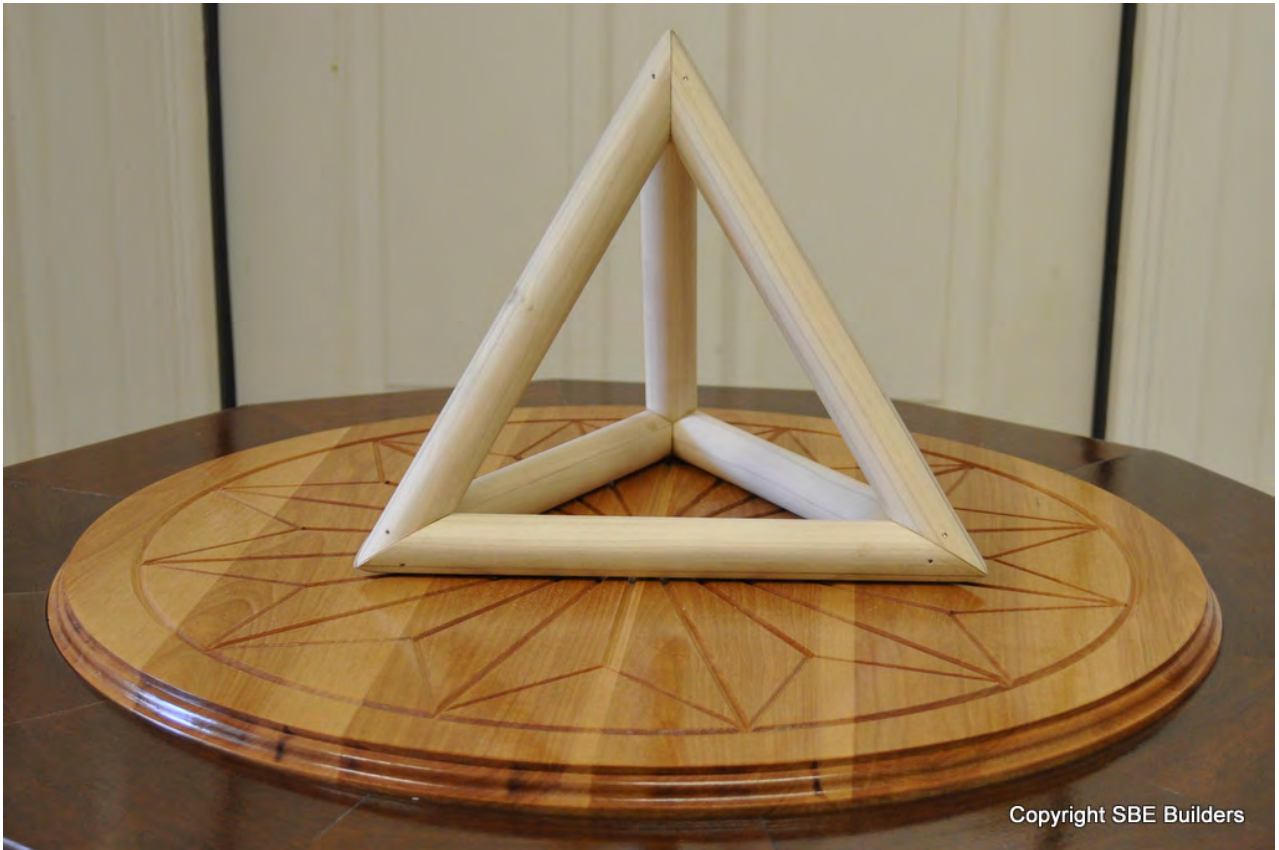
Tetrahedron Angles

D Angle = 30.0000
 A Angle = 37.3774
 C Angle = 20.9052
 E Angle = 54.0000
 B Angle = 31.7175

90-D Angle = 60.0000
 90-A Angle = 52.6226
 90-C Angle = 69.0948
 90-E Angle = 36.0000
 90-B Angle = 58.2825

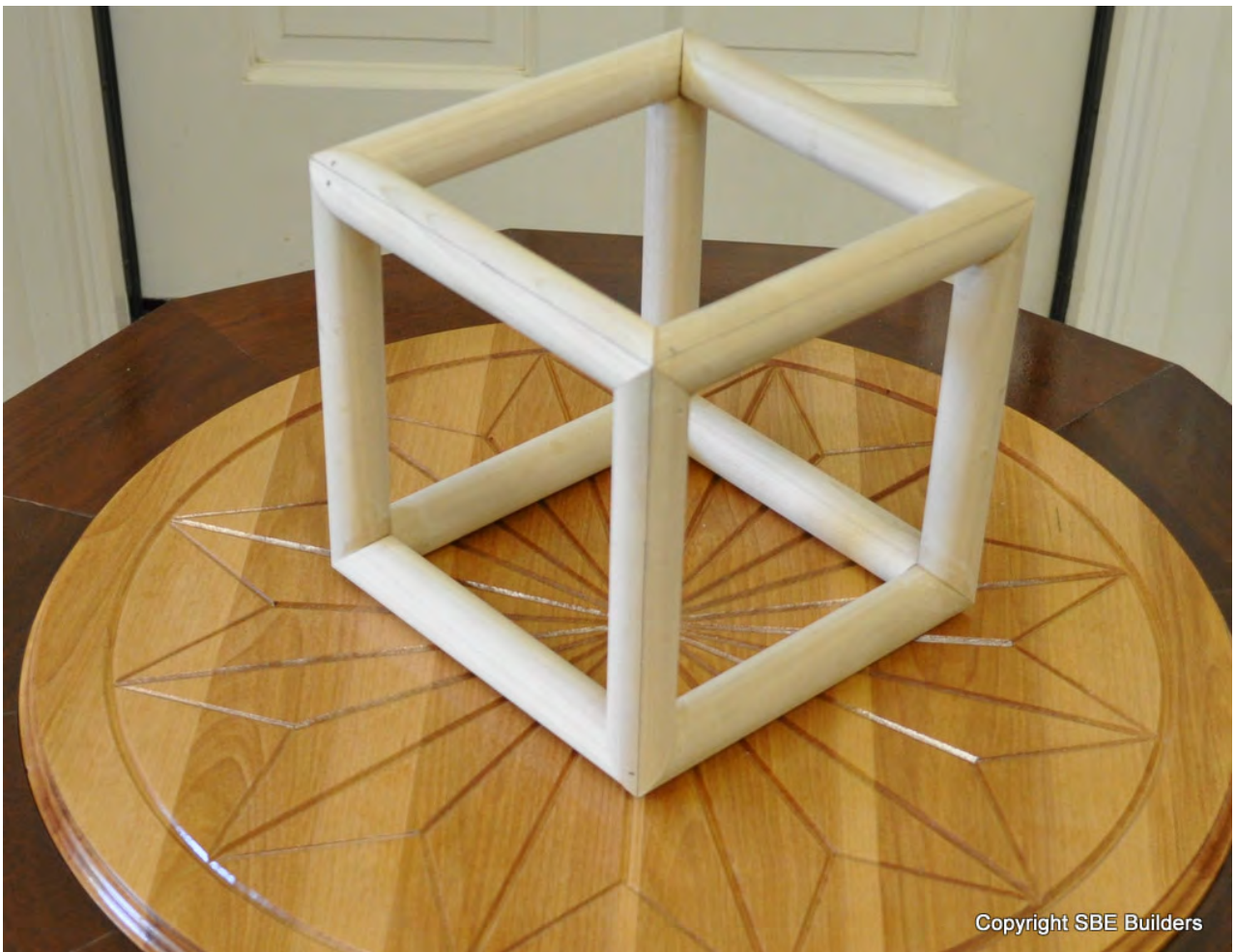


Tetrahedron



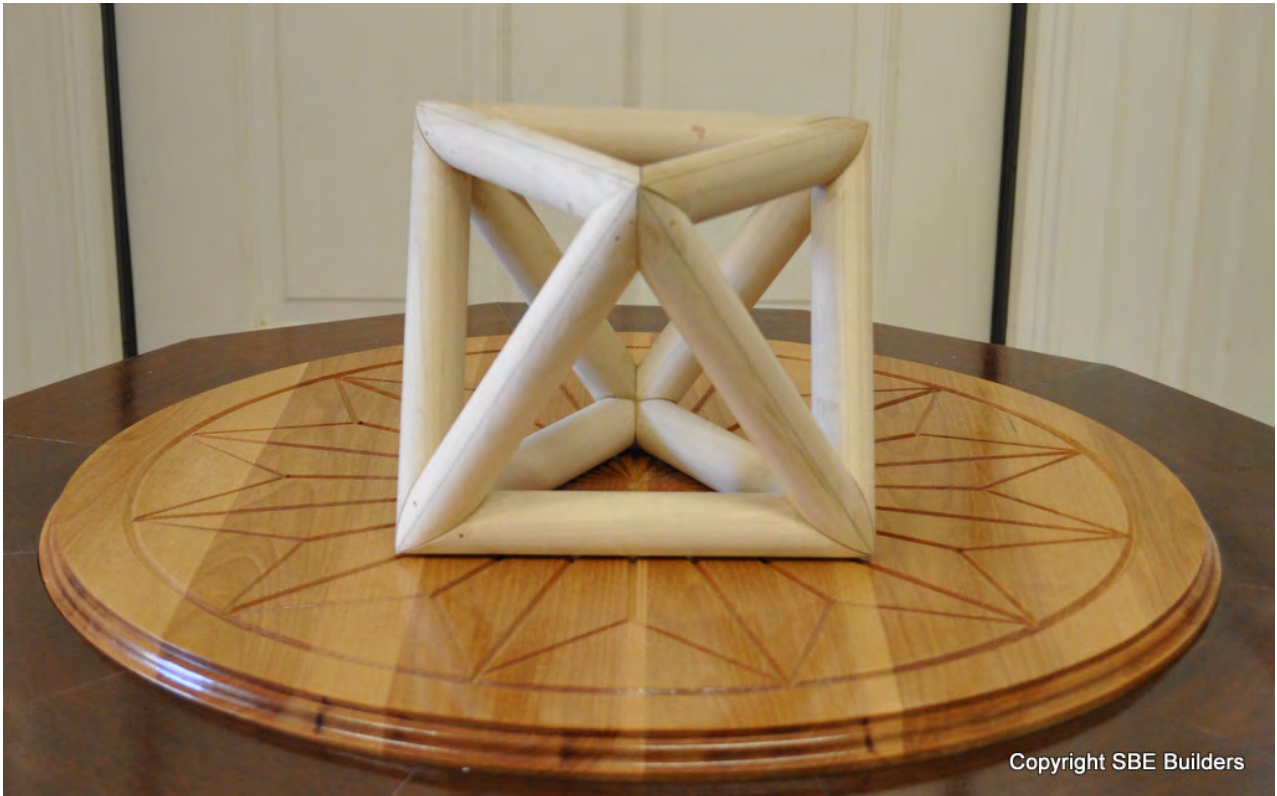
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Octahedron



Icosahedron



Dodecahedron



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