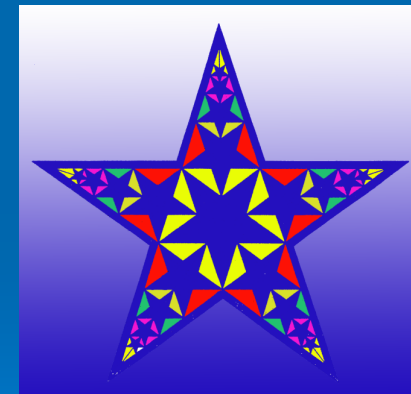
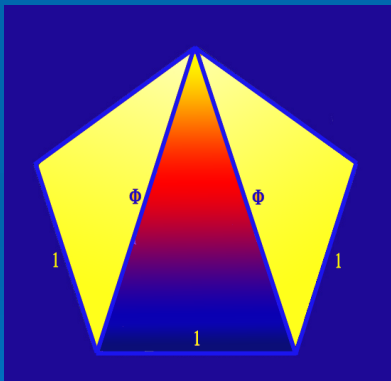
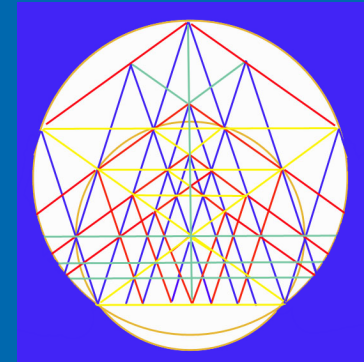
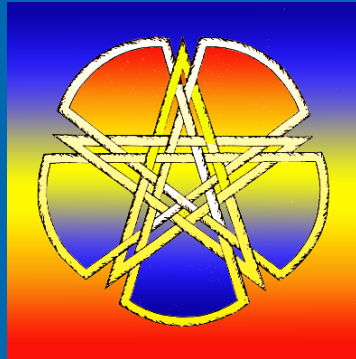


# SG106.la Pentagons, Pentagrams & the Penta-Modules

Online Module SG 106 / Intro VI



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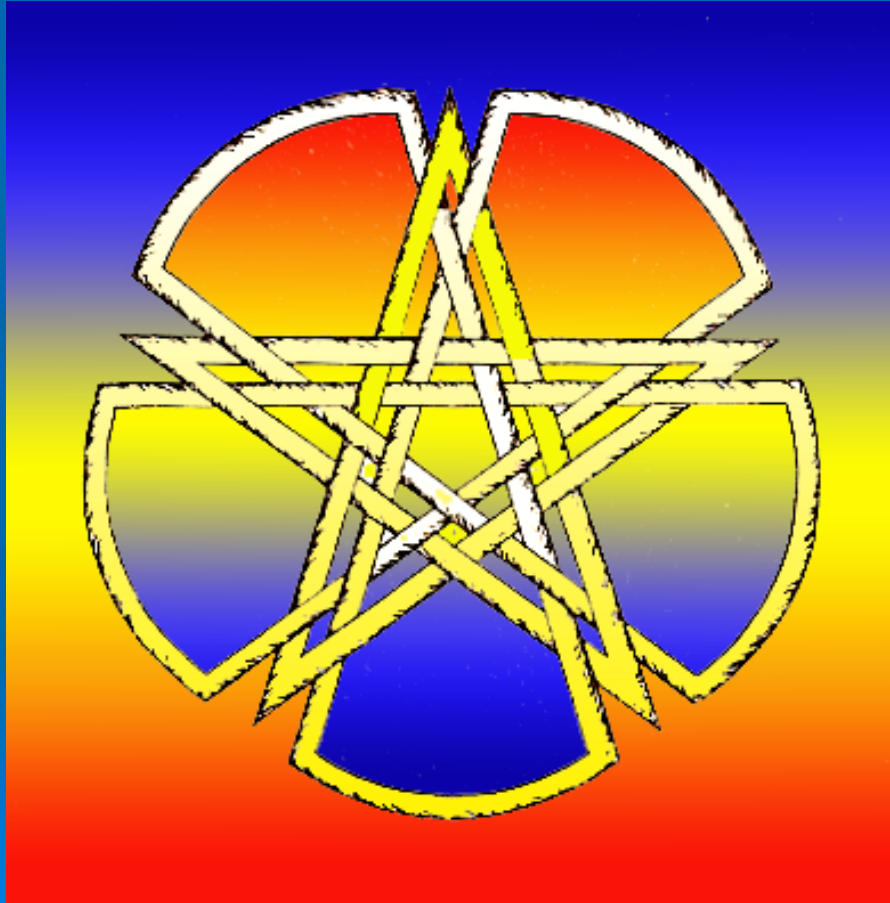
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## SG106. 1c. Pentagons & Pentagrams



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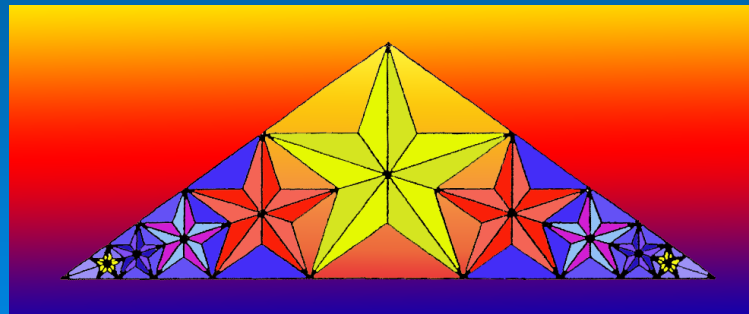
## SG106.Id Pentagons, Pentagrams & the Penta-Modules

By tracing the five inner diagonals of the Pentagon, every two vertices, one obtains the traditional figure of the *Pentagram* or *5-pointed Star*.

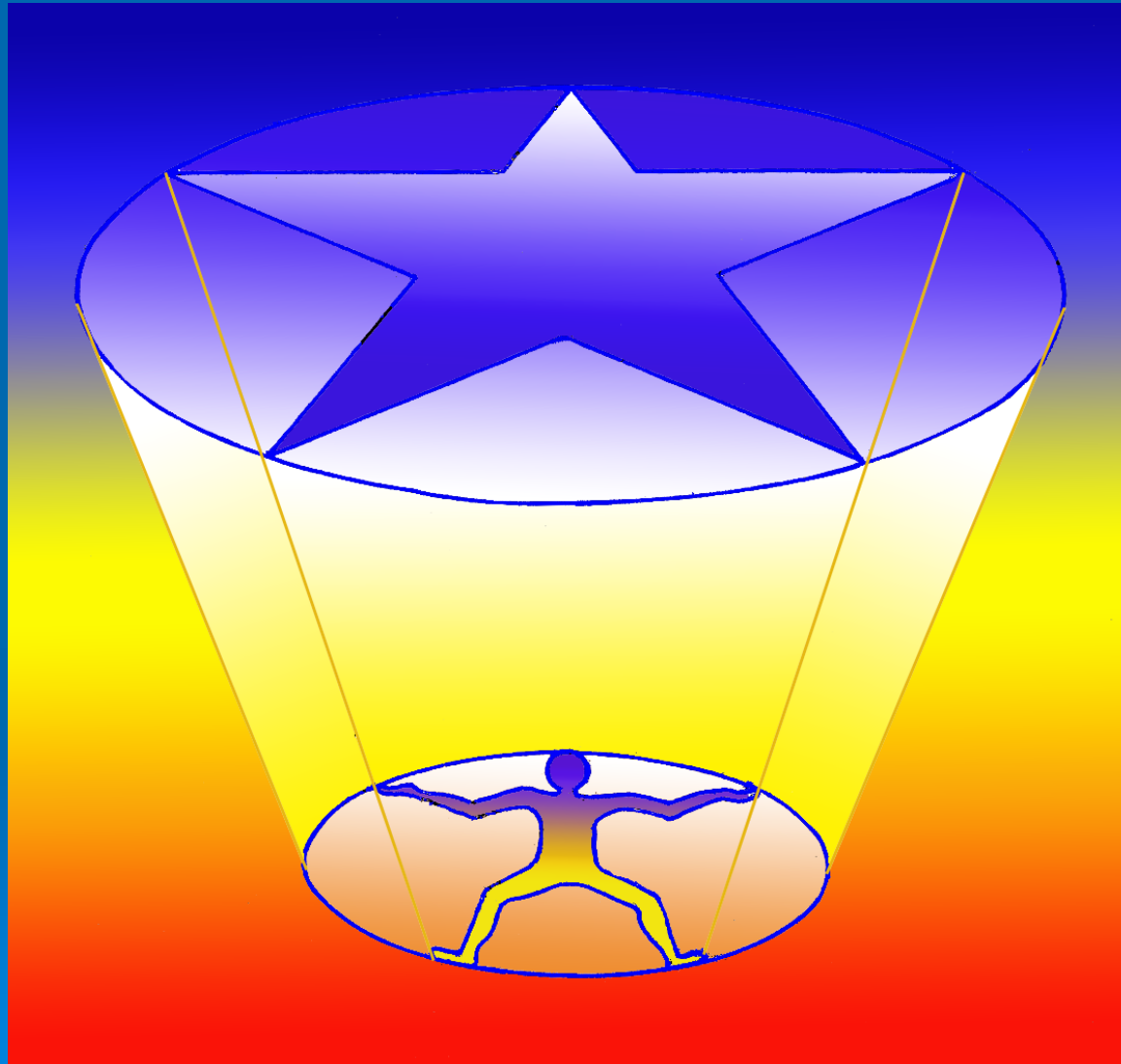
The Pentagon is the best 2D embodiment of the Golden Ratio PHI. The Pentagon/Pentagram figure is a self-similar fractal: it can self-embed to infinity because it is built upon multiples & sub-multiples of the PHI ratio. In fact, only two basic shapes are needed for pentagonal Golden symmetry: the *Golden Triangle* and the *Golden Gnomon* - the two “*Penta-Modules*”.

We will briefly visit the symbolic meanings of the Pentagon/Pentagram figure, its classical geometric constructions via the two Penta-Modules, the various penta-symmetries recently uncovered by science and we will glimpse a few examples of this spectacular figure as found all over nature and culture...

As the expression goes: “*Give me Five!*”  
Happy encounter with FIVE!



# SG106.1 Chapter 1. The Pentad



## SG106.1.1 The Pentad - Archetype of Harmony

Five - 5 - the Pentad is an archetypal number that has always been associated with HARMONIC RELATIONSHIP. Because of its direct geometric & mathematical connection to the Golden Ratio PHI  $[(\sqrt{5} + 1) / 2]$ , the Greek Pythagoreans called Five the “Nuptial Number”.

Below is a poetic enumeration of some of the names given to the number Five, in many traditions. Let us remember that in Sacred Geometry, numbers are not just signs on a page or screen but are LIVING ENTITIES. In the words of Theon of Smyrna (Greek mathematician & philosopher c. 70-135 CE):

*“Numbers are... almost human in their capacity for mutual influence”*

Creation	Lack of Strife	Star of Knowledge
Androgyn	Cyclical Mover	Apple Blossom
Unity of Odd & Even	Pentacle & Pentalpha	Indriya - Five Senses
Immortal	Number of Man	Pentatonic Music Scale
Golden Flower	Do not overstep a beam	Center of Tetraktys
Fifth Essence	Flower of Love	Engenderer of Light
Heart-Like	Gateless Protection	DNA Decagonal Dance
Living Geometry	Five Platonic Solids	Diapente Music Ratio
Frequency of Love	Prana - Fivefold Breath	Pentagram Star

↑ Traditional qualities & attributions for the Pentad “5”.

## SG106.1.2.1 The Pentagram - Sacred Symbol (1)

### Why is the Pentagram considered “Sacred”?

1. The Pentagram is the traditional & classical representation of Micro-Cosmic Man as touching the Circle of Life in 5 points (see the circle in the “Da Vinci Man”, with the navel marking the Phi Proportion in the human body).

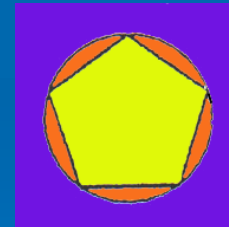
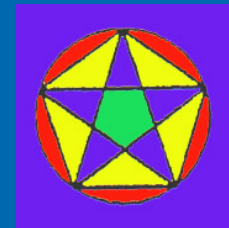
2. The Pentagram was the historical greeting of the Pythagoreans as a symbol of Unity and brotherhood. The Pythagoreans saw 5 as a “*weighing instrument*”, fulfilling a function of “*Justice*”.

As half the Tetraktys, the Five was called the “*manifested Tetraktys*”.

3. Greek Philosophers called the number 5 or Pentad “*the Nuptial Number*”. First, because it is at the center of the first nine number-archetypes of the universe and thus balances them out as a perfect hub. And also because it is the first number to encompass the two genders: 5 is the sum of the first female even number “2” and the first male odd number “3”. Thus 5 is the “Nuptial Number” of Love, Marriage and Life.

4. The Pentagram can be traced in a single stroke. There is no break between Origin and Return to Origin. This uncut line was likened to the uncut thread of the Fate-Goddess and the uncut spiritual “umbilical cord” or “Silver Cord”.

5. In geomantic cosmologies, 5 is the center of the cross formed by the cardinal Four Directions, the center of the universe where the axis of the world pierces through human space-time. In many traditions, 5 is also the number of the present world (the Fifth World), after four preceding evolutionary experiments.



## SG106.1.2.2 The Pentagon - Sacred Symbol (2)

6. The Pentagon & Pentagram are found all over Nature - mostly "organic" nature (while 6 & 8 govern "inorganic" and "inanimate" nature). It is the universal form of Life.

7. Five signals to man his proper foods and alliances. Five is safe. Plants displaying a six-fold structure (such a tulip, lily, poppy...) are often poisonous. Traditional medicine considered seven-petal plants to be counter-indicated.

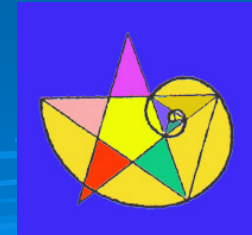
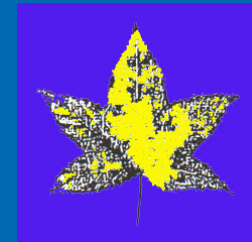
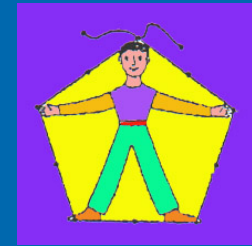
On the other hand, the very "*flowers of love*" are all governed by pentagonal symmetry: rose, orchid, azalea and the passion flower...

8. The mystical, symbolic & mythological lore of the "apple" is wide-spread. The apple has a cross section revealing the perfect pentagon of Life and is, symbolically, a sought-for prize.

9. In terms of Sacred Geometry, the Pentagon / Pentagram is the standard of the Golden Ratio. The Penta figures are replete with golden ratios, golden triangles and golden gnomons... The Phi ratio between the diagonal and side of the pentagon is incommensurable: Phi is an "irrational" number (well suited for Life) and as such a window into "infinity".

10. There are 5 (and only 5) volumes with equal sides and equal angles. These are the 5 Platonic Solids.

11. The angle between two sides of a pentagon is 108 degrees, a canonical lunar number (Moon diameter = 1080 miles; 108 = atomic weight of silver etc...).





## SG106.1.2.3 The Pentagram - Sacred Symbol (3)

12. As symbols of Sacred Geometry, the Pentagon represents the microcosm, while the Hexagon represents the macrocosm. These two figures are often united as a symbol of the true relation between humanity and the universe.

A real cosmology will balance out the "5" principle and the "6" principle, Moon and Sun, Compassion-Love and Power-Knowledge.

13. The Penta figures can be nested into each other *ad infinitum*. They form the Cosmic Ladder for Ascension / Descension, the place where Above & Below can be reached, encountered or at least briefly glimpsed.

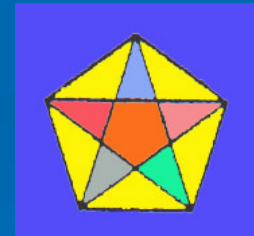
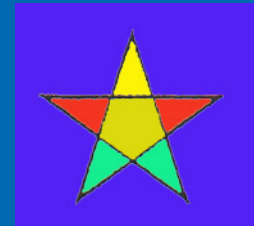
14. Each level of nesting is inverted, alternatively upward and downward pointing. This reversal of energy dynamics creates a polarity alternation basic to cosmic laws.

15. In Chinese Taoist philosophy & practice, the Pentad refers to the Five Elements. In Medieval Europe, the "Quintessence" was the hub of the Four Elements.

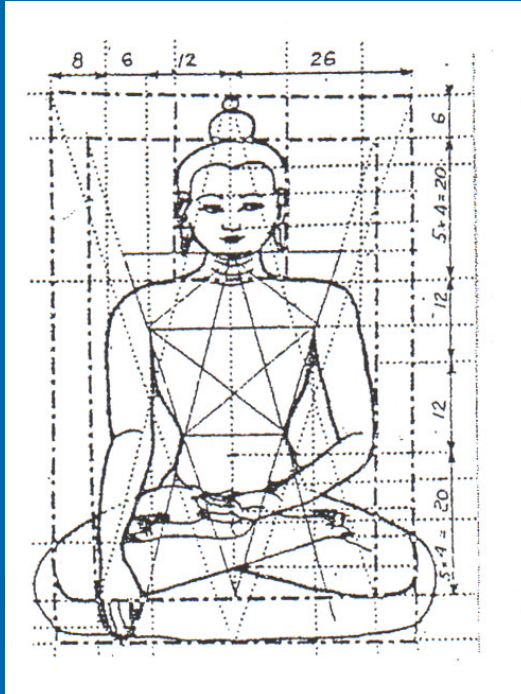
16. Worldwide, the Five-Star re-occurs as a symbol of achievement & excellence in rating systems, from flags to movies to hotels...

17. As a spiritual sign / talisman of protection and blessing, the Pentagram has a long history. Also known as Pentacle, Pentalpha, Star of Knowledge, Star of Bethlehem..., the Pentagram is a "*gateless*" boundary for healing magic.

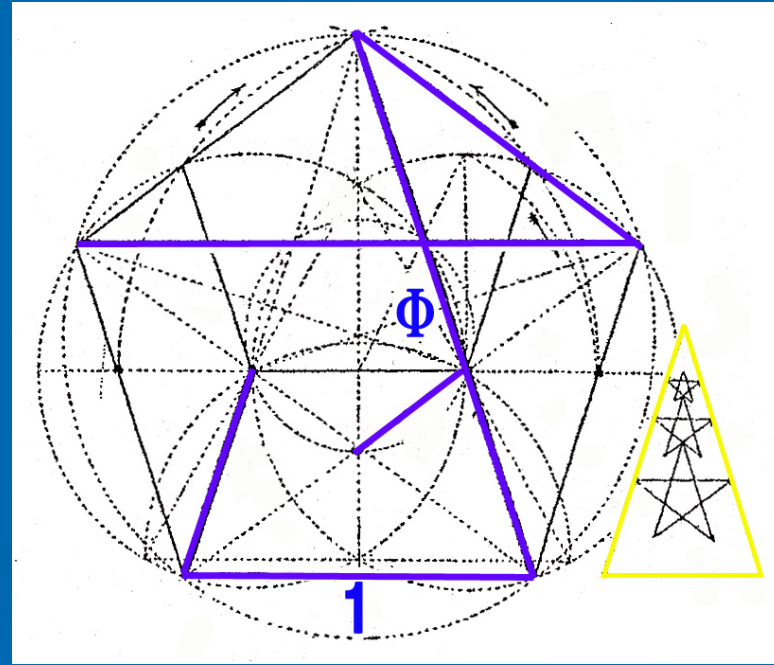
18. 360 degrees divided by 5 = 72, another canonical number in mystical numerology. It takes 72 years for the Earth to go through one degree of the precessional cycle of 25,920 years.



## SG106.1.2.4 The Pentagram - Sacred Symbol (4)



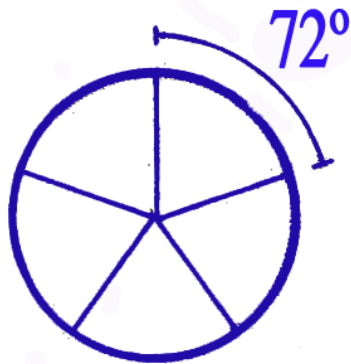
↑ Use of the Pentagram in the modular design of Buddhist representations.



↑ The cascading choreography of the Golden Ratio in the Pentagon/Pentagram.

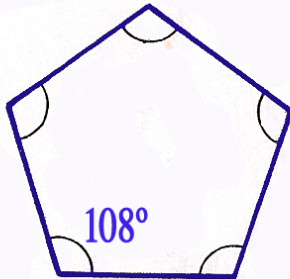
## SG106.1.3.1 About "Pentas" (1)

Looking up the dictionary under *penta-* (Greek for "five"), there are a number of related terms:



### The "Pent-Arc"

The circle of  $360^\circ$  divides into 5 arcs of  $72^\circ$  each. 72 is divisible by all other numbers from 1 to 9, except 5 itself and the other "magical" number 7. 72 is also divisible by the zodiacal number 12 and multiples of 12 by 2, 3 and 6.



### Pentagon

(*penta + gonon = angle*)  
A polygon  
with 5 equal angles ( $108^\circ$  each)



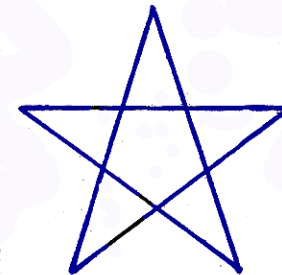
### Pentahedron

(*penta + hedron = face*)  
A solid bounded by 5 faces.  
Example (above):  
a 4-sided pyramid.



### The "Pent-Angle"

(inner angle of the pentagon)



### Pentagram

(*penta + grammon = letter*)

A figure formed  
by the 5 diagonals  
of the pentagon.



### Penta-Star

(Egyptian hieroglyph)

## SG106.1.3.2 About “Pentas” (2)

**Pentacle:** Activated pentagram.

**Pentad:** The archetypal number Five. A group of five.

**Pentalpha:** (*penta* + *alpha* = A): A pentagram (seen as formed by five “A”).

**Pentamerous Flower:** Having each floral whorl consisting of five or multiples of five.

**Pentameter** (*penta* + *metros* = measure): A line of verse containing five metrical measures.

**Pentastich** (*penta* + *stichos* = step): A poem or stanza of five lines or verses.

**Pentateuch** (*penta* + *teuchos* = vessel, book): The five first books of Jewish & Christian scriptures.

**Pentaptych** (*penta* + *ptyche* = fold): Work of art consisting of five panels or sections.

**Pentatonic Scale:** Musical scale of five notes.



### Cinquefoil

(medieval French, *cinq* = five, *foil* = leaf)

Stylized symbol of 5-petaled flowers  
(rose, apple blossom).

Associated with the Great Goddess  
and hidden secrets.



## SG106.1.4.1 On the Pentacle (1)

(Medieval Latin *pentangulum* = five angles; *pentaculum* = small five).

The Pentacle is an activated Pentagram forming a protection sign. Constructed of a single unbroken line, it is a "gateless" boundary used to mark off magical enclosures, for invocation or banishment. Being endless, the Pentacle takes on the perfection and power of the circle. Colorfully named in many cultures, the Pentacle is associated with the School of Pythagoras, healing, magic, talismans & amulets, paganism, geomancy, mysticism, sacred geometry and more...

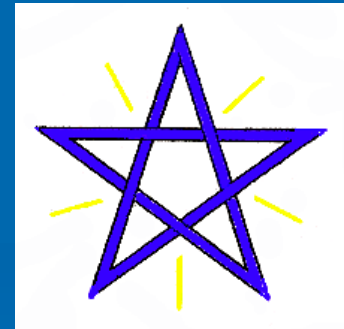
For the Pythagoreans, the Pentacle was the symbol of the Goddess of Health (*Hygea*) and a sign of initiation into the knowledge of higher geometries (Phi proportions of the Pentagram).

An apple transversely cut (golden section) reveals a pentacle-core (called by the Gypsies the *Star Of Knowledge*).

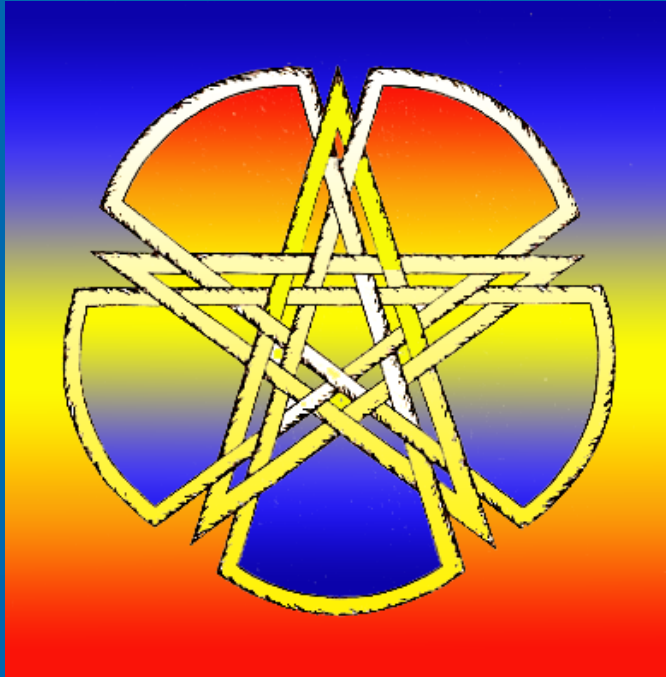
The Genesis story of Eve inducing Adam into "sin" by offering him an apple appears to be a distortion of the ancient symbolism about the magic apple fruit. See the many myths & quests about "golden apples" and apple trees of longevity & knowledge. The apple and its pentacle-core represents the original gift of life (phi creation codes) and not the original sin!

A gypsy method of healing consisted of "*measuring the pentacle*". A string was stretched across the patient in the pentacle format ; it was then burned and mixed with water as a healing potion.

In the Tarot, the suit of Pentacles (which evolved into the modern "*diamonds*") represents the element Earth with its multiple meanings of nurturing embrace, fertility, abundance, riches...



## SG106.1.4.2 On the Pentacle (2)

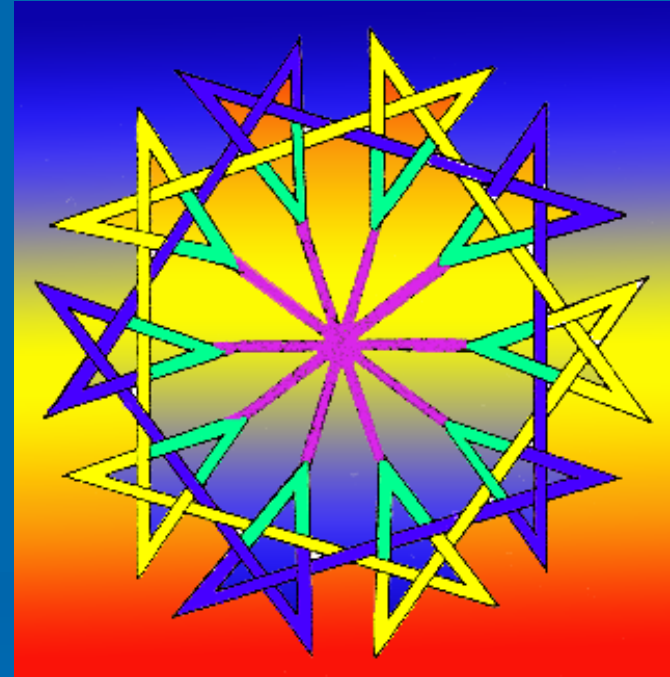


### Pentacle Flower

A composite symbol  
made of a pentacle  
interlaced  
with a 5-petaled flower.  
Flower & star  
represent  
Earth and heaven.

Druid's Foot  
Pentagram  
Pentalpha  
Pentamorph  
Pentangle  
Seal of Solomon  
Star of Isis  
Star of Knowledge  
Star of the Magi  
Signum  
Pythagoricum  
Signum Salutatis  
Virgin's Pentacle  
Witch's Cross  
Wizard's Star

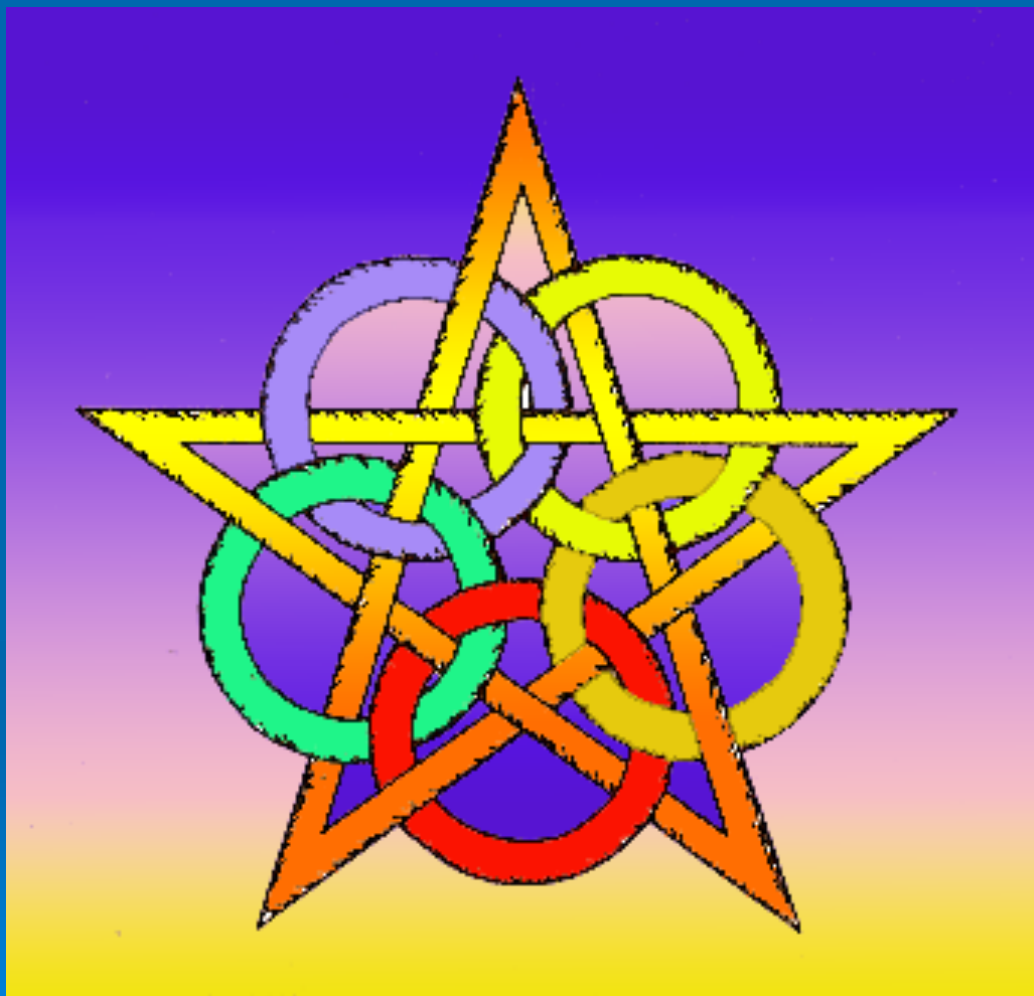
↑ Various names  
for the Pentagram



### Penelope's Web

Ten Pentacles traced by only two lines.  
A symbol of protection and unification.  
Penelope unwove her web each night  
rather than cut the thread  
representing Odysseus and his life.  
She is the Preserver of Life.

### SG106.1.4.3 On the Pentacle (3)



#### Ring Pentacle

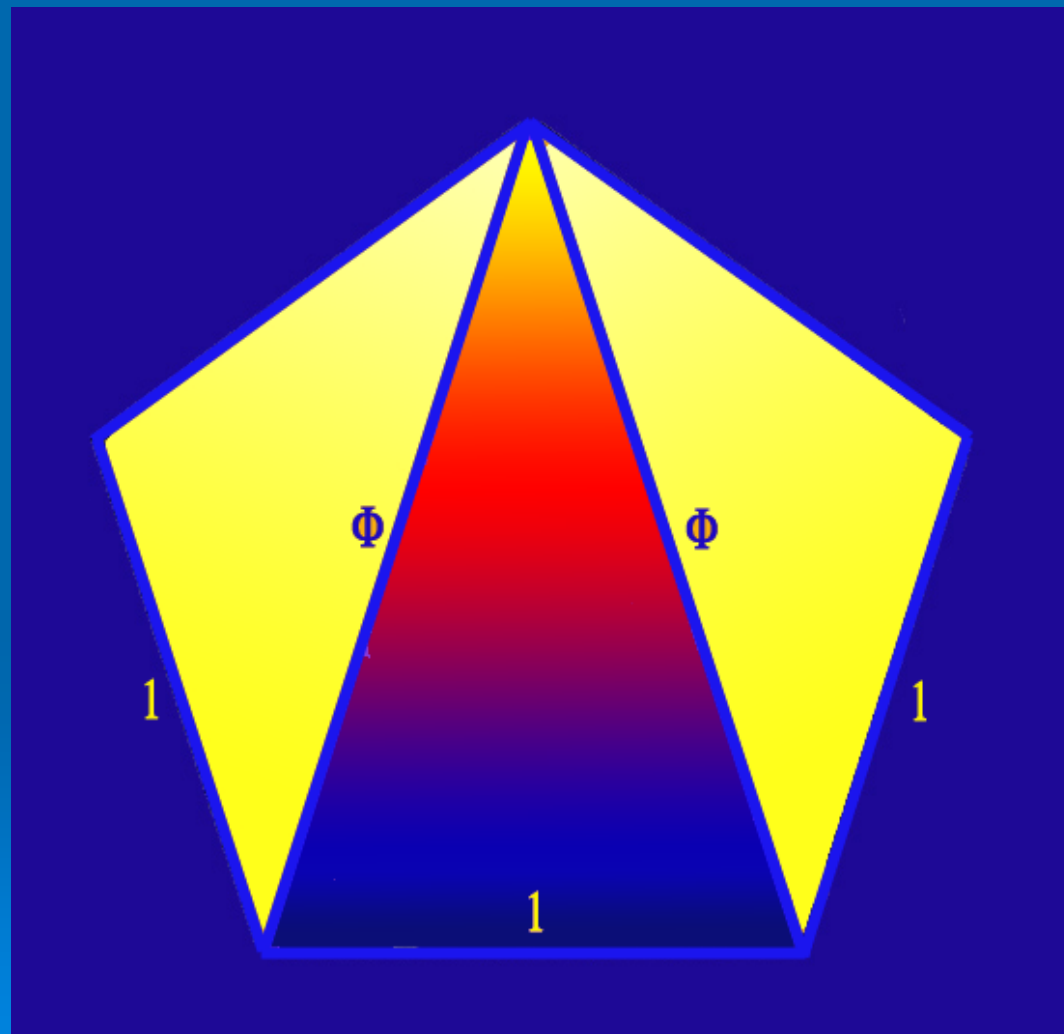
A mystical symbol unifying  
lines & curves,  
points & circles,  
male & female.

The Yin Yoni Penta-Ring  
is pointing down.

The Yang Lingam Pentalpha  
is pointing up.

Engages vision both  
to an inner journey  
and/or a still contemplation.

## SG106.2 Chapter 2. The Two Penta-Modules





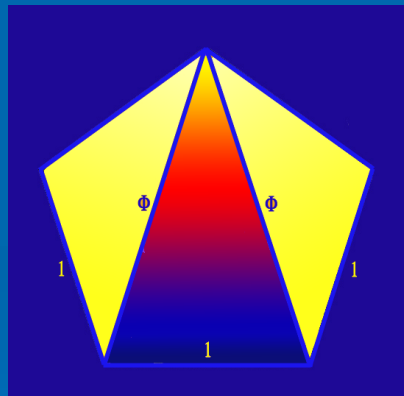
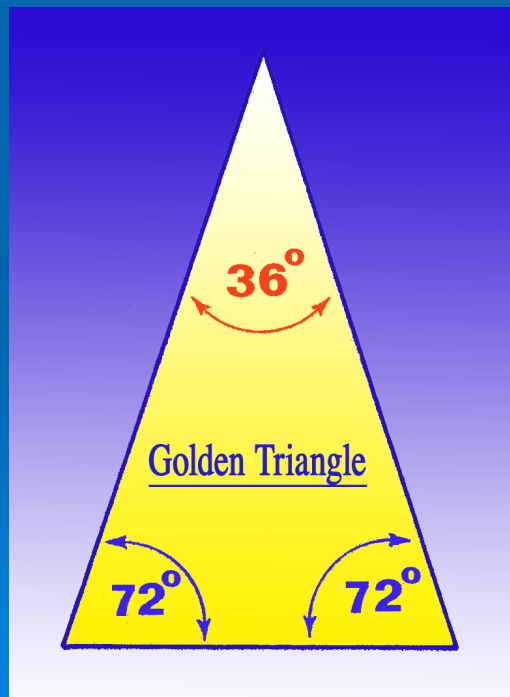
## SG106.2.1 The Two Penta-Modules

The two Penta-Modules are the two basic triangular components of the Pentagon/Pentagram:

### The Golden Triangle The Golden Gnomon

The two Penta-Modules are all you need to build & design Pentagons & Pentagrams, as they are complementary and can be divided (or expanded) into smaller (or larger) proportional triangles, up and down the scale of magnitudes.

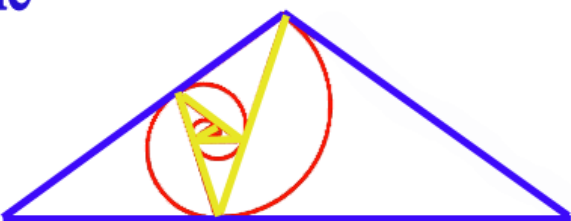
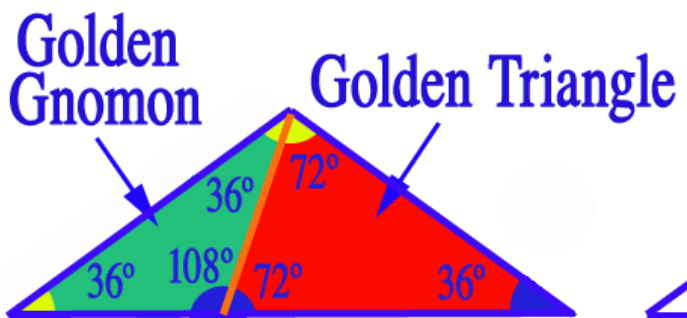
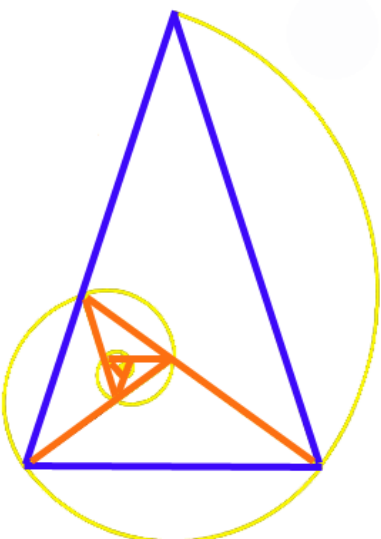
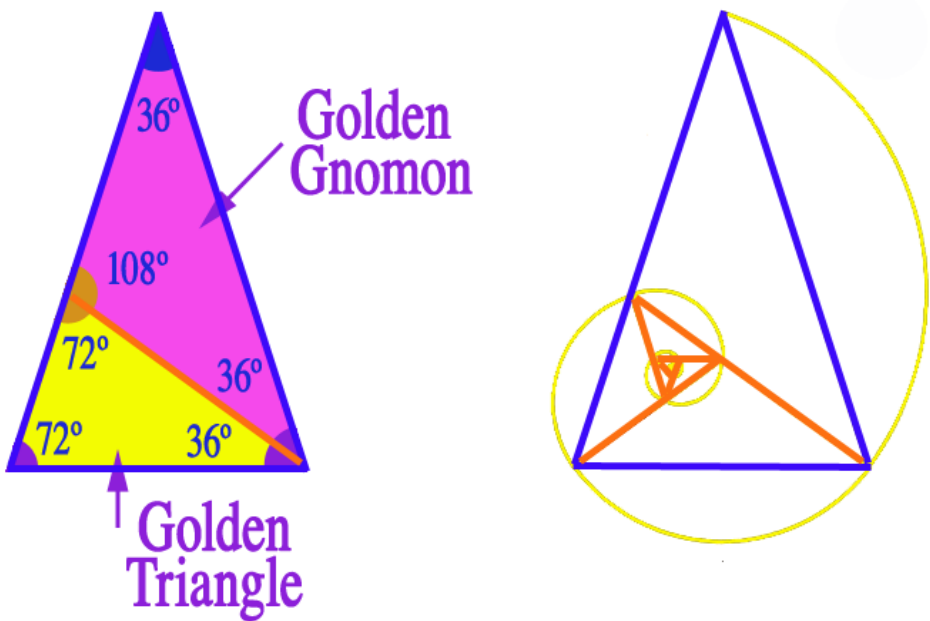
They allow for the pentagonal tiling of the 2D plane (Penrose Tiling) and for beautiful puzzle games.



# SG106.2.2.1 The Penta-Modules Spirals

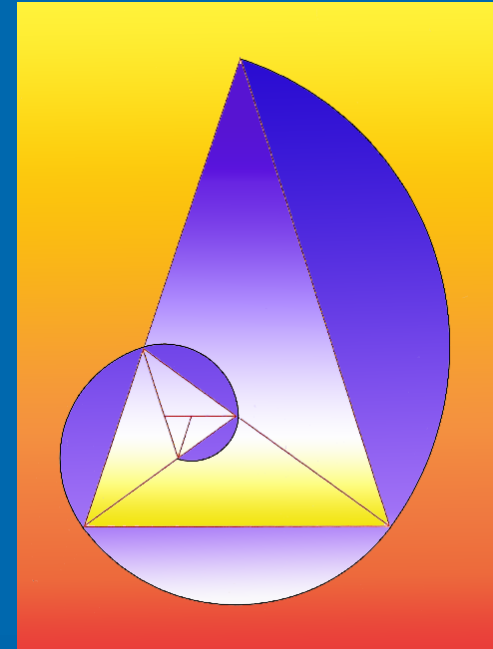
The most simple (one step) division or folding of the Penta-Modules creates a smaller harmonic self-similar module and its complementary. It's a couple's dance of reciprocity!

← The Golden Triangle one-step division into 1 baby Golden Gnomon & 1 baby Golden Triangle... and the Golden Spiral this harmonic division creates.



← The Golden Gnomon one-step division into 1 baby Golden Triangle and 1 baby Golden Gnomon... and their spiraling offspring.

## SG106.2.2.2 The Penta-Modules Spirals (2)



↑ The Golden Spiral in the Golden Triangle. (PhiArt106-1)

← Great Circle Spirals in the Golden Triangle. (PhiArt106-2)

## SG106.2.3.1 The Golden Triangle

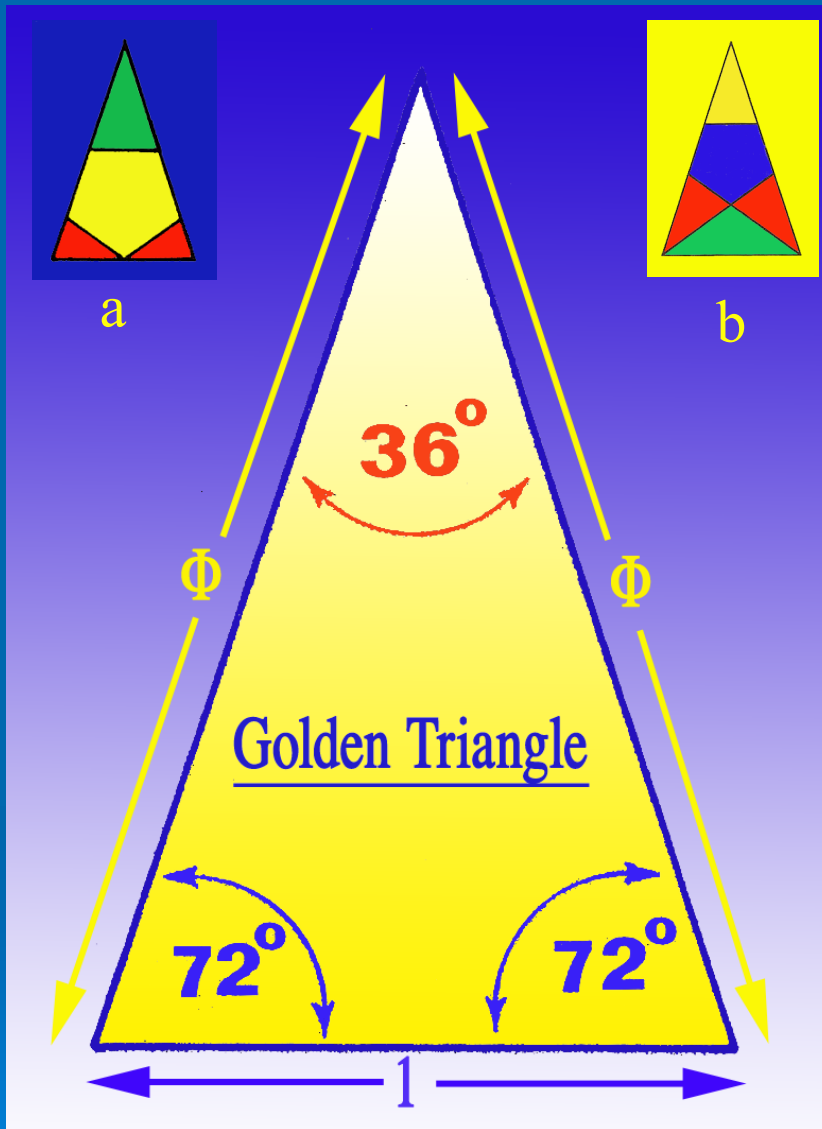
The Golden Triangle is an acute isosceles triangle with two base angles of  $72^\circ$  and a top angle of  $36^\circ$ . It embodies the PHI Ratio: the base is unit 1 and the two sides are  $\Phi$ .

The Golden Triangle and Golden Gnomon are reciprocally divisible.

The Golden Triangle can be infinitely subdivided into a variety of smaller harmonic shapes, all involving submultiples of the Golden Triangle or Golden Gnomon. It is like music, all about the harmonic resonance of PHI!

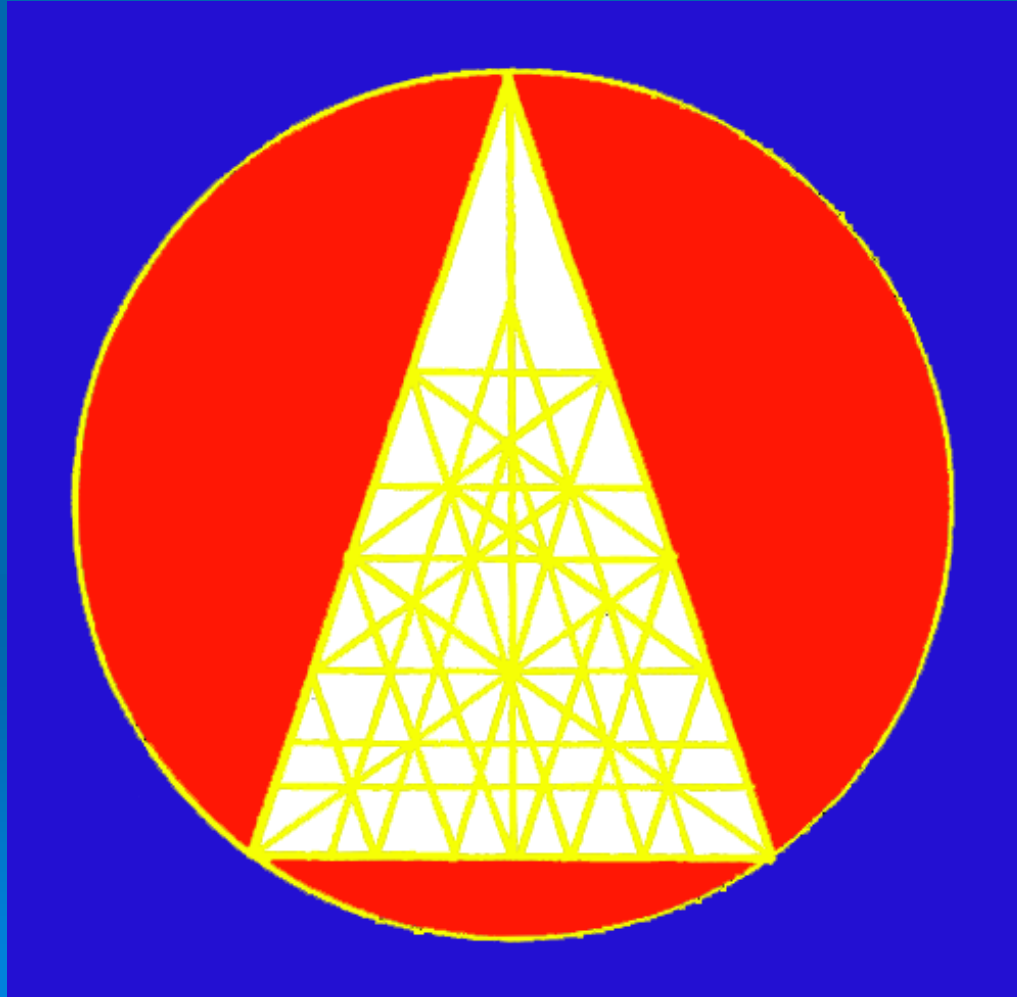
### Examples:

- a. One pentagon (yellow), 1 small Golden Triangle (green) and 2 even smaller Golden Triangles. All in PHI proportions.
- b. One pentagon (blue), 1 small (orange) and 2 (red) Golden Triangles + a green Golden Gnomon.

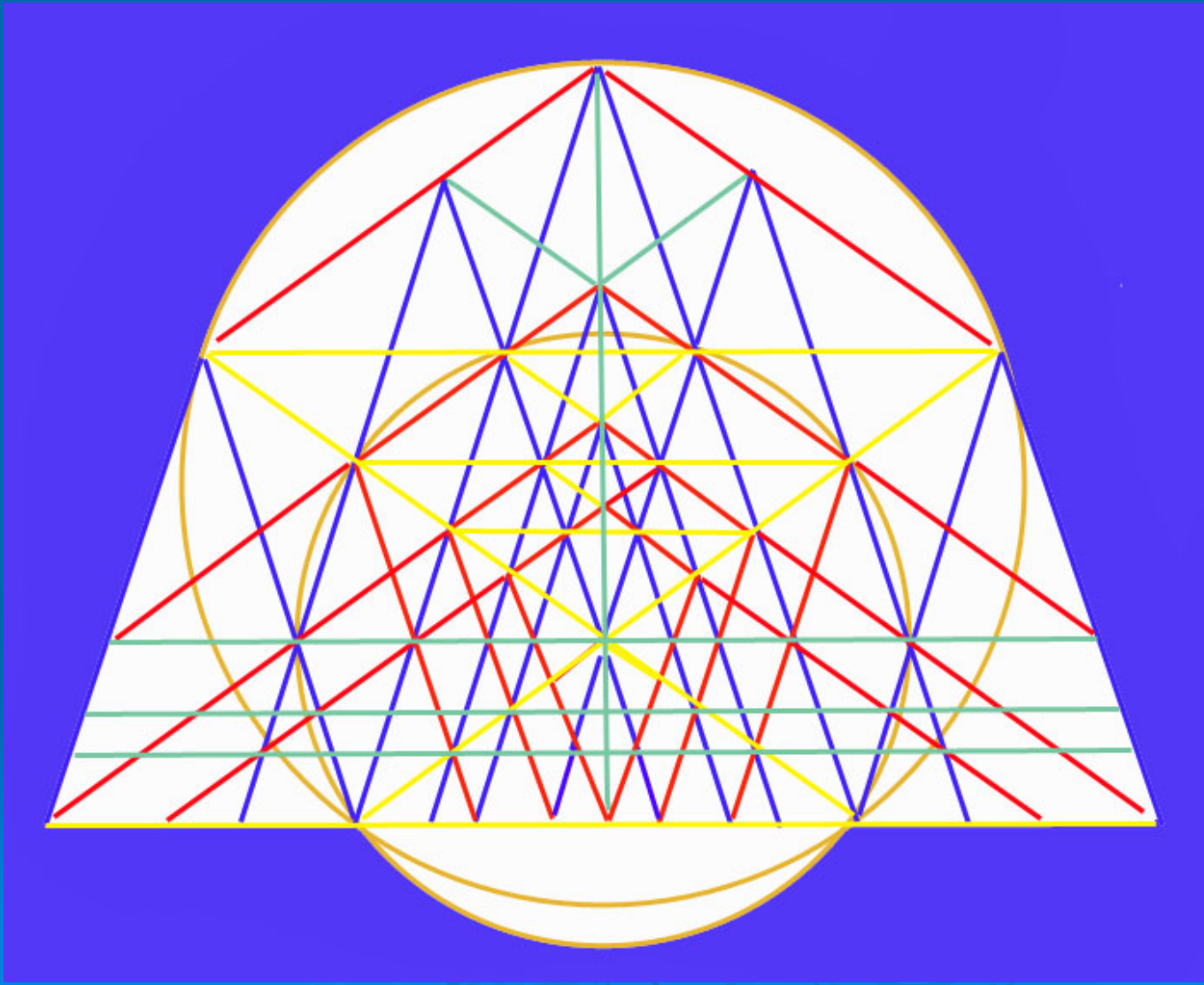


The golden Triangle is also called:  
*Sublime Triangle, Divine Triangle  
and Acute Golden Triangle*

## SG106.2.3.2 Golden Triangle - Inner Geometries



## SG106.2.3.3 Triangular Grid in the Pentagon



## SG106.2.4.1 The Golden Gnomon



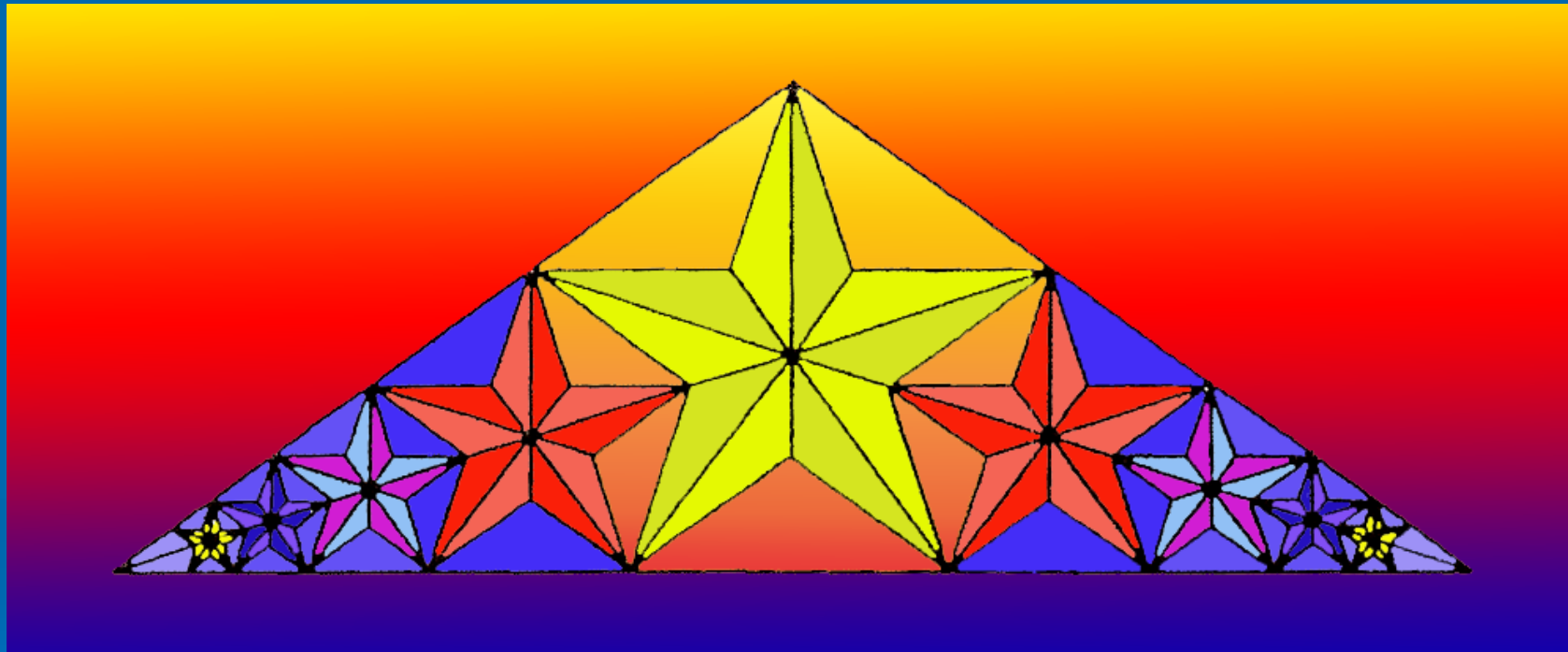
The Golden Gnomon (a gnomon is the part remaining after taking a similar part) is also called *Luminous Delta*, *Silver Triangle* and *Obtuse Golden Triangle*.

The Golden Gnomon is an obtuse isosceles triangle with two base angles of  $36^\circ$  and a top angle of  $108^\circ$  (the inner angle of the Pentagon). It also embodies the Golden Ratio, in a complementary way to the Golden Triangle: the base is  $\Phi$  and the sides are 1.

Just like the Golden Triangle, the Golden Gnomon can be infinitely subdivided:

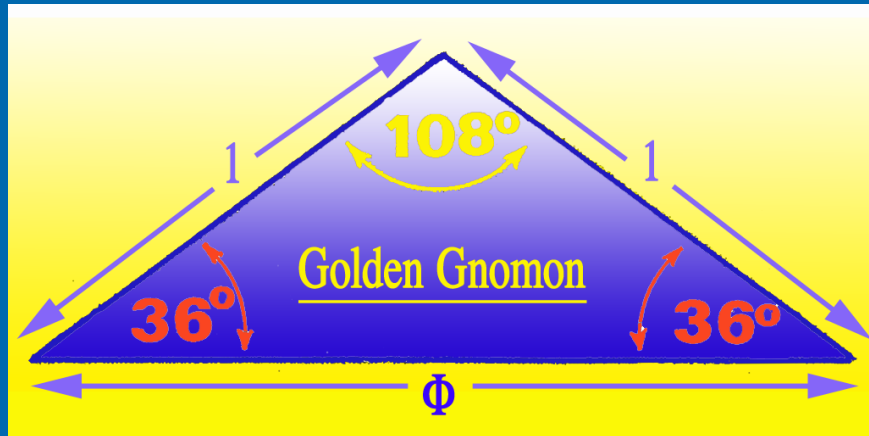
- One blue pentagon and two red Golden Triangles.
- One yellow Golden Triangle and two blue Golden Gnomons.

## SG106.2.4.2 The Golden Gnomon - Inner Geometries



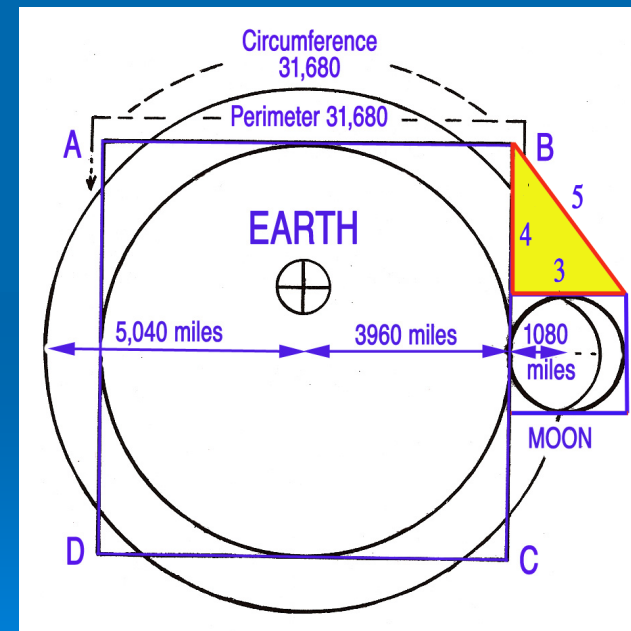
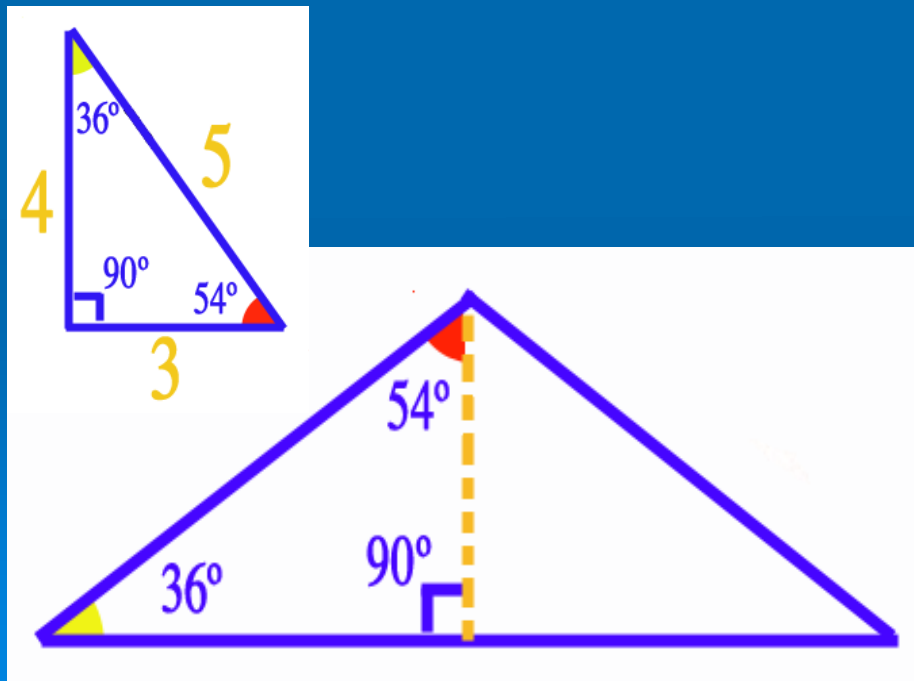


## SG106.2.5.1 The Golden Gnomon & 3-4-5 Triangle (1)



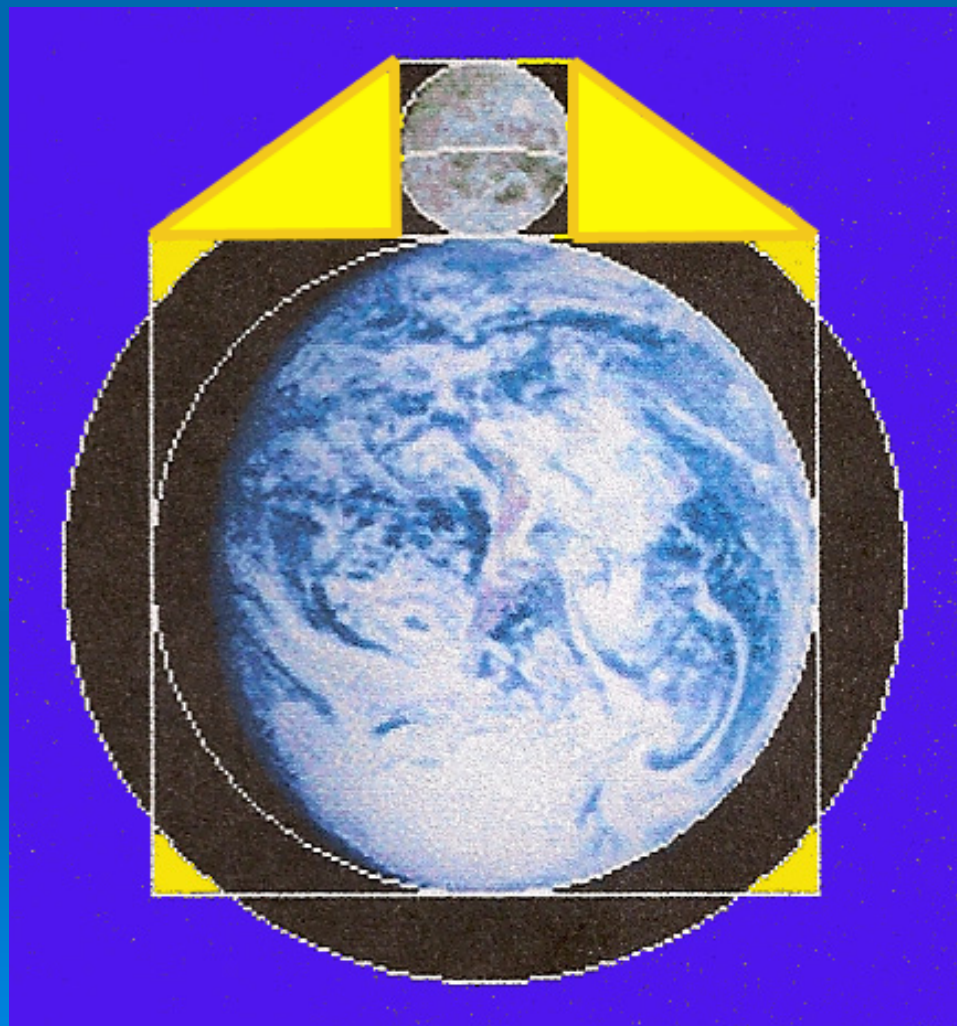
The vertical median of the Golden Gnomon (bisecting the top angle of  $108^\circ$  into two  $54^\circ$  angles) creates two classical 3-4-5 “Pythagorean” triangles.

This 3-4-5 triangle is involved in many canonic Sacred Geometry designs & templates.



↑ The Earth-Moon Template  
(After John Michell)

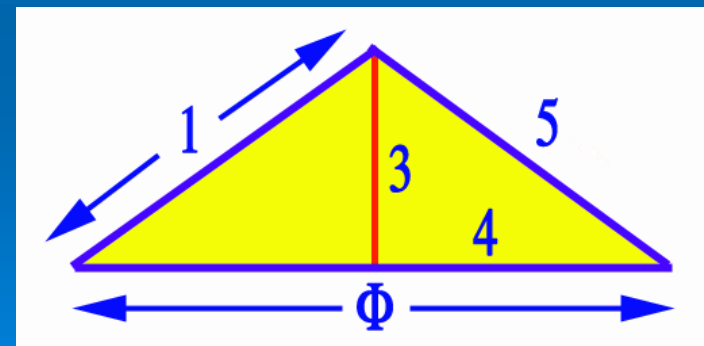
## SG106.2.5.2 Golden Gnomon & 3-4-5 Triangle (2)



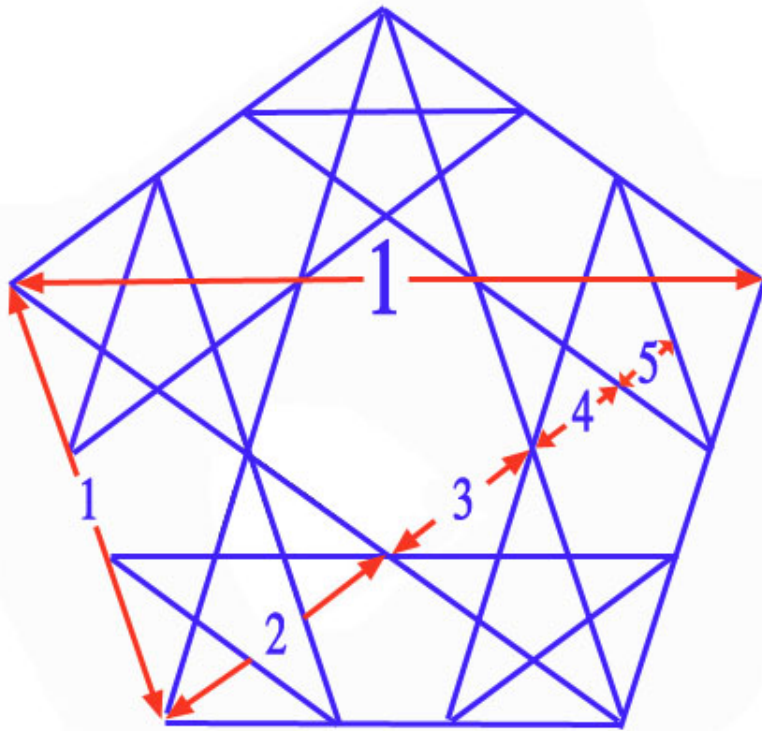
The two 3-4-5 “seed triangles” framing the Moon in the Earth-Moon Template are the two halves of a Golden Gnomon.

The Golden Gnomon is one of the two Penta-Modules creating the Phi-based geometry of the Pentagon/Pentagram.

The Earth and Moon proportional measurements are based on PHI.



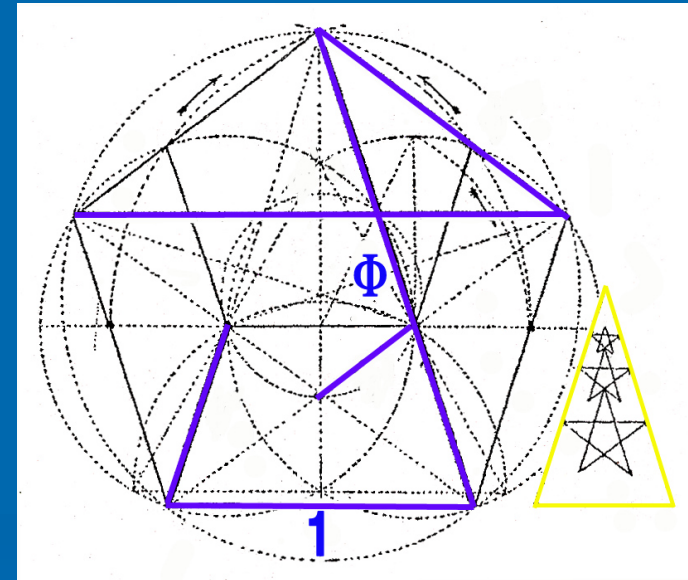
## SG106.2.6 PHI Progressions in the Pentagon



### Harmonic PHI Diminishing Progression

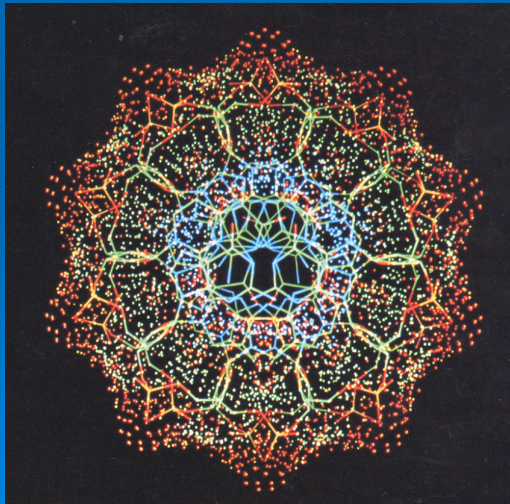
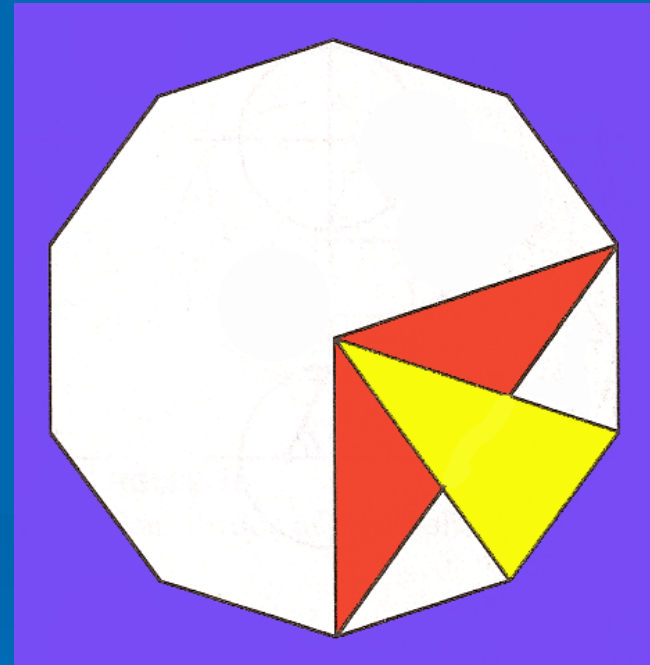
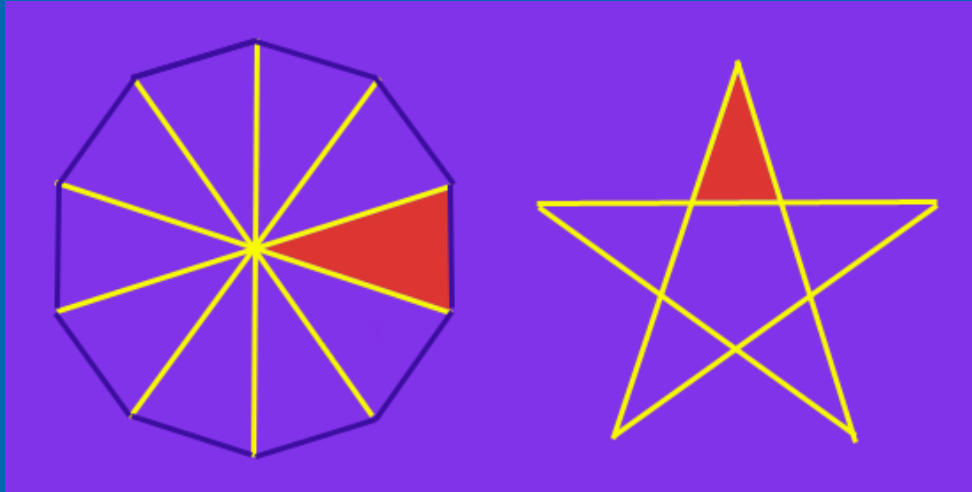
$$1 = 1/\Phi \quad 2 = 1/\Phi^2 \quad 3 = 1/\Phi^3$$

$$4 = 1/\Phi^4 \quad 5 = 1/\Phi^5$$



← This is also called the "Five-Star Crown".

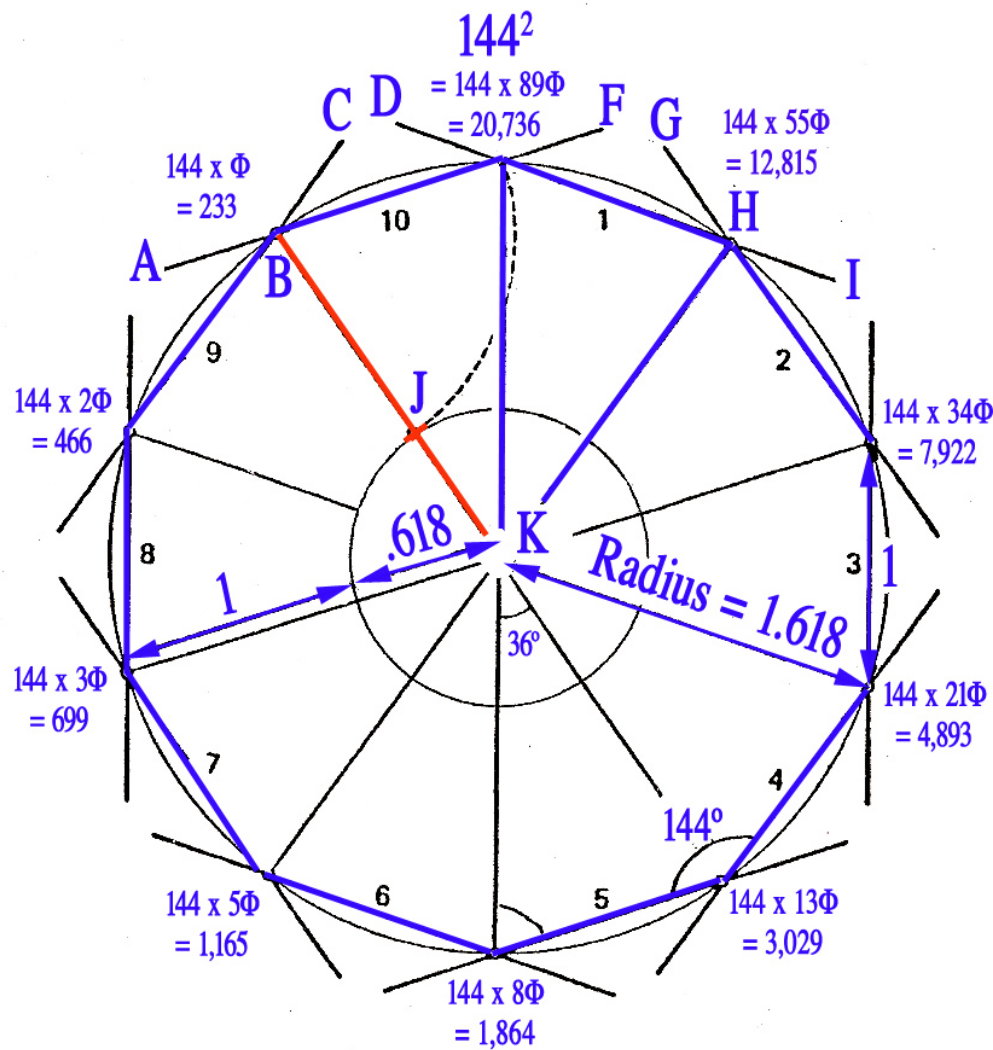
## SG106.2.7.1 The Golden Decagon (1)



← DNA decagonal symmetry

↑ The radii and diagonals in the regular decagon show the Golden Triangle & Golden Gnomon.

## SG106.2.7.2 The Golden Decagon (2)



In the Decagon, the multiples of  $\Phi$  move in a parallel Fibonacci expansion.

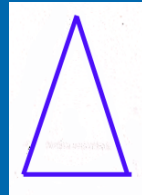
The Decagon (“Double Pentagon” or “Di-Pentagon”) is a cosmic template revealing extraordinary relationships. It brings together the circle, the Golden Ratio properties of the Pentagon, the harmonic power of 10, the Fibonacci numbers... and, according to some researchers, the Harmonic of the Speed of Light 144 which is the inner angle of the decagon ( $144^\circ$ ).

Geometrically, the subtended angles ABC, DEF etc... =  $144^\circ$ . Each inner angle KBE, KEH etc... =  $72^\circ$ . Note the ten Golden Triangles (base = 1, sides = Phi). When the side of a regular (inscribed) pentagon is traced along the radius of the circle, the radius is divided into the Golden Section (side BE traced along BK to point J).

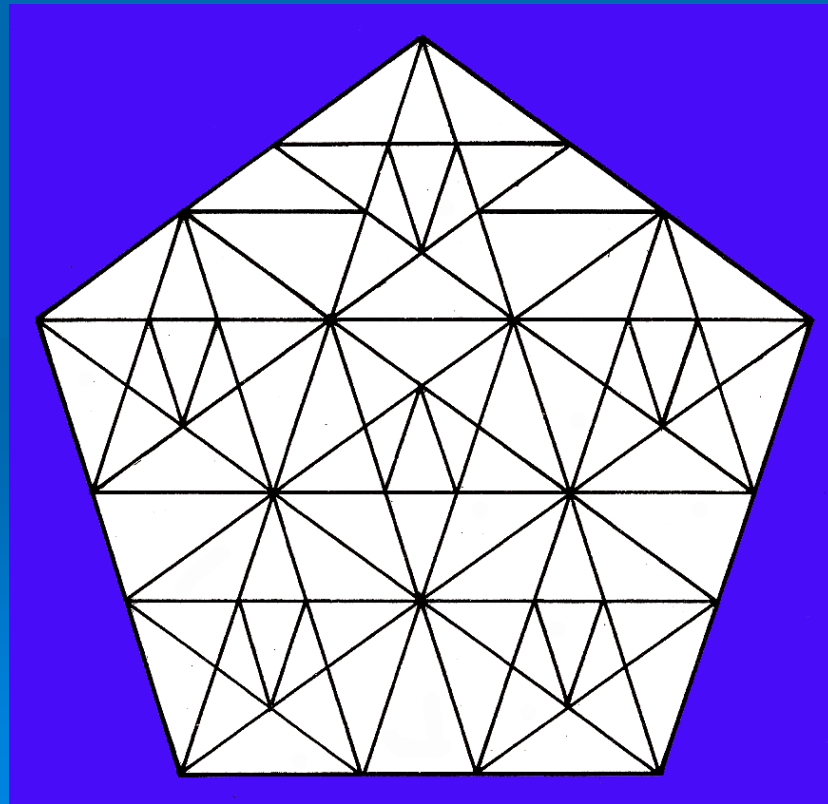
## SG106.2.8.1 Penta Puzzles (1)

Because of the Golden Harmonics inherent in the Pentagon / Pentagram figures, a great variety of beautiful designs can be obtained within a regular pentagon by rearranging only 4 components: 4 proportional sizes of the two Penta-Modules:

1. Larger Golden Triangle
3. Larger Golden Gnomon



2. Smaller Golden Triangle
4. Smaller Golden Gnomon



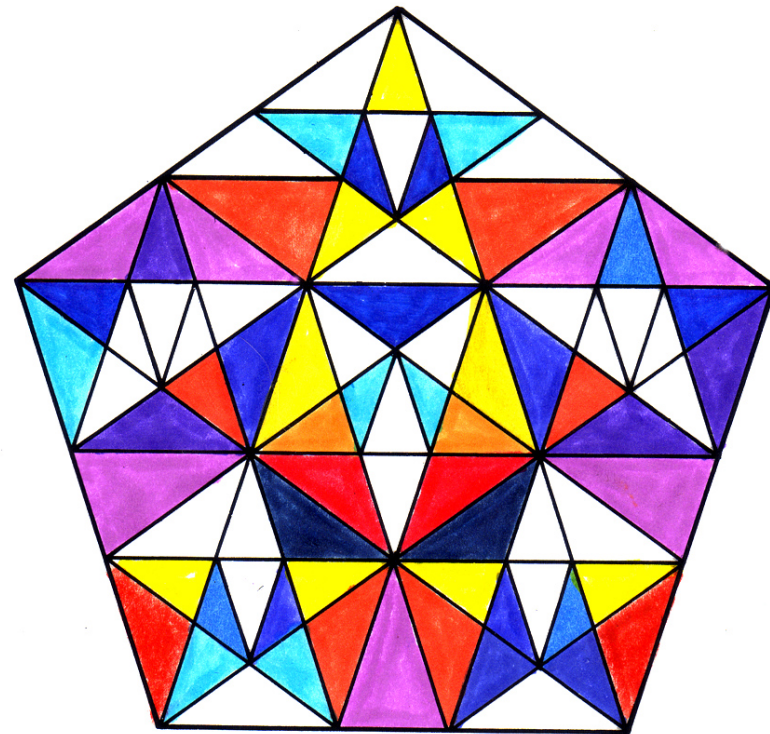
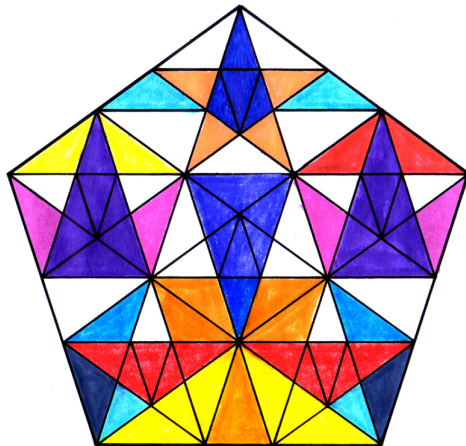
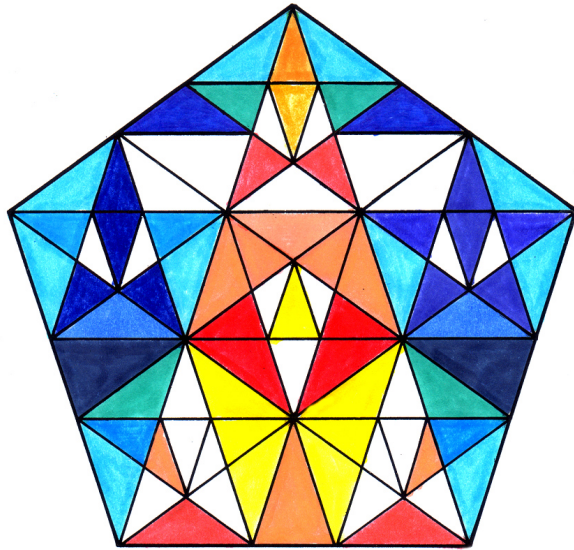
← Template for Penta-Puzzle PP-83

This particular Penta-Puzzle has 5 larger Golden triangles, 36 smaller Golden Triangles, 30 larger Golden Gnomons and 12 smaller Golden Gnomons.

The sum of the component shapes = 83.  
Hence the name: PP-83.

## SG106.2.8.2 Penta Puzzles (2)

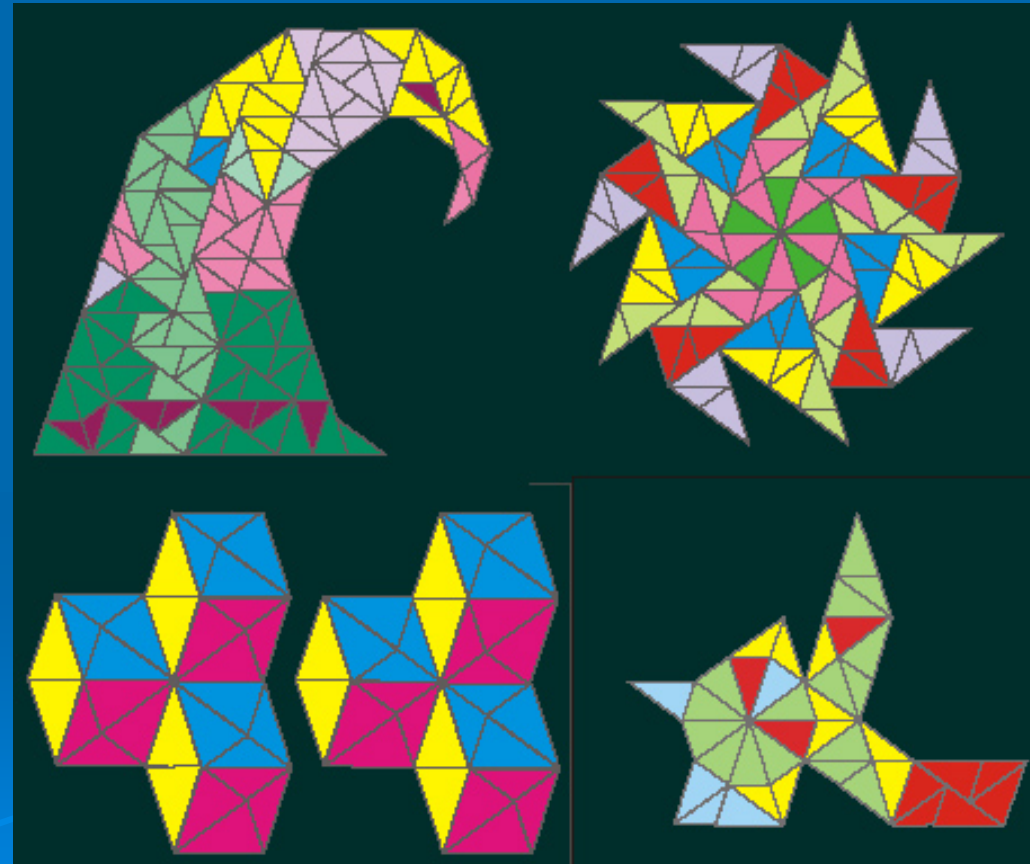
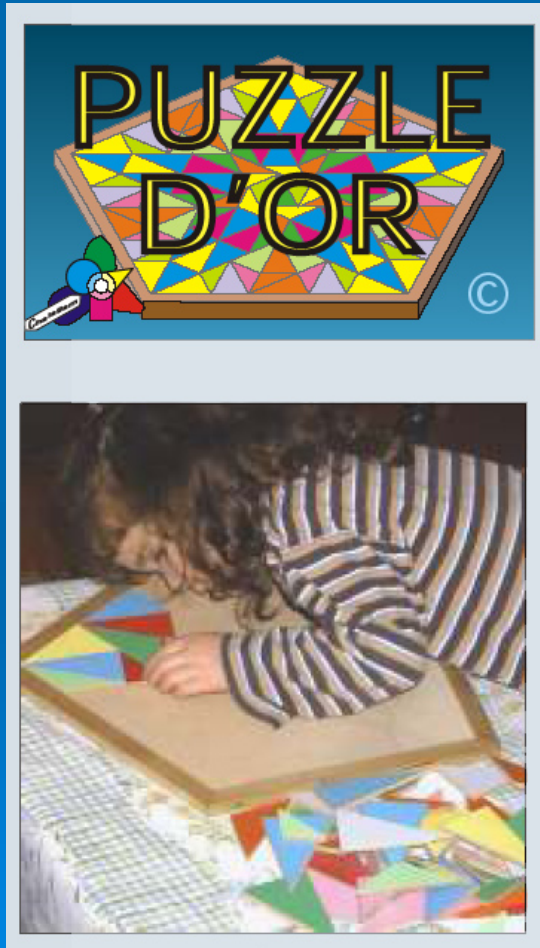
Examples of colorful PP-83 Puzzles.



## SG106.2.8.3 Penta Puzzles (3) PP-123

The “*Puzzle d’Or*”, prototyped by Chalagam Editions in France, is a captivating and beautiful art object composed of 123 Golden components (Large & small Golden Triangle and large & small Golden Gnomon).

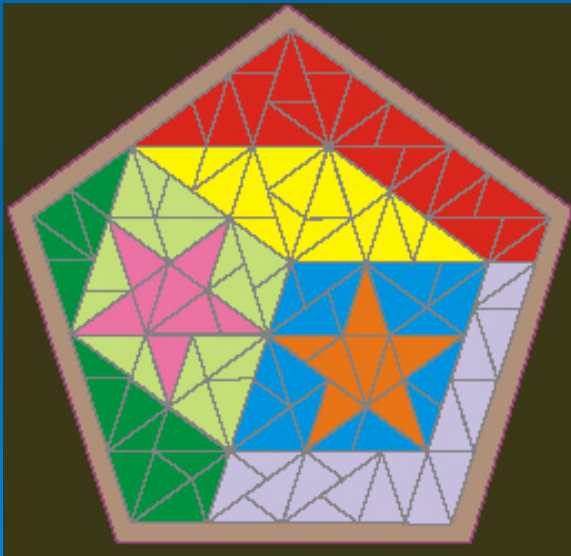
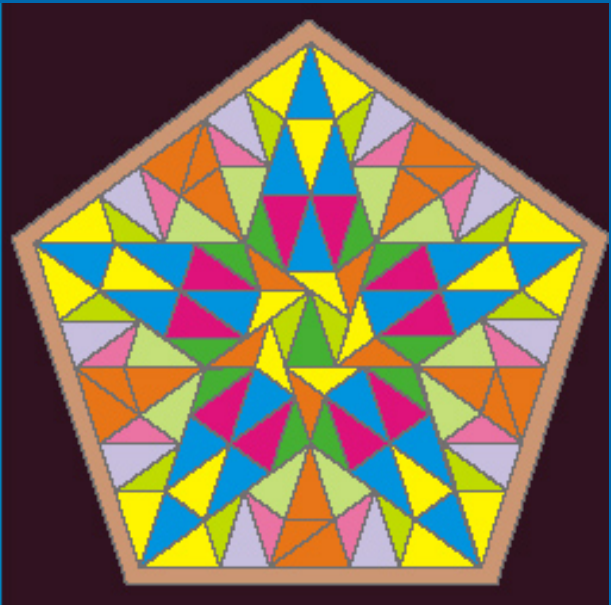
[www.chalagam.com](http://www.chalagam.com)



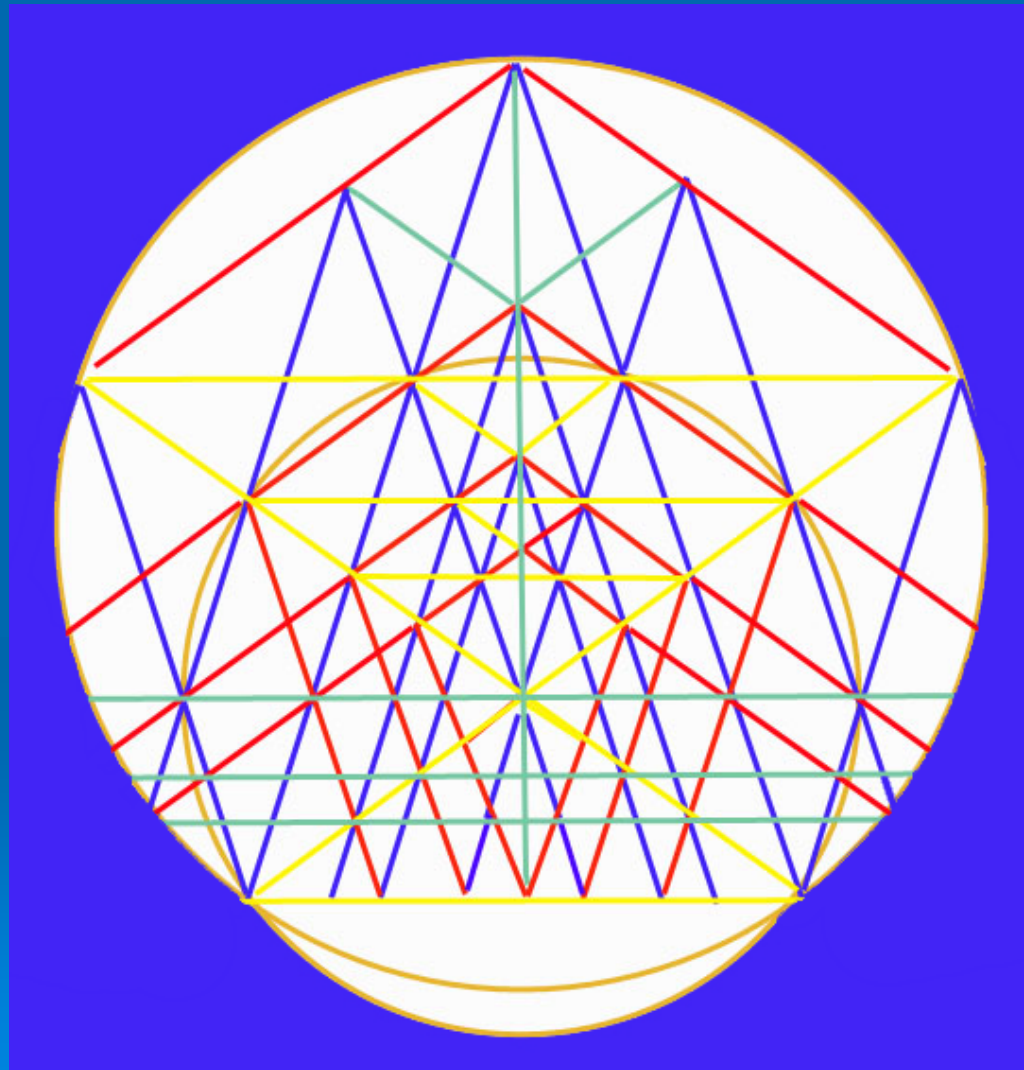


SG106.2.8.4

**Penta  
Puzzles (4)  
PP-123**

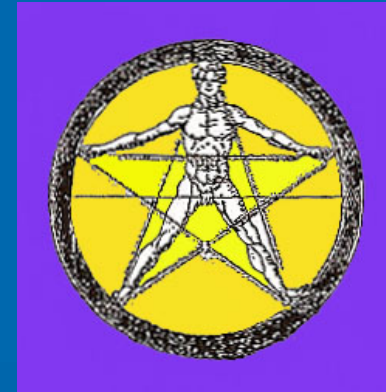
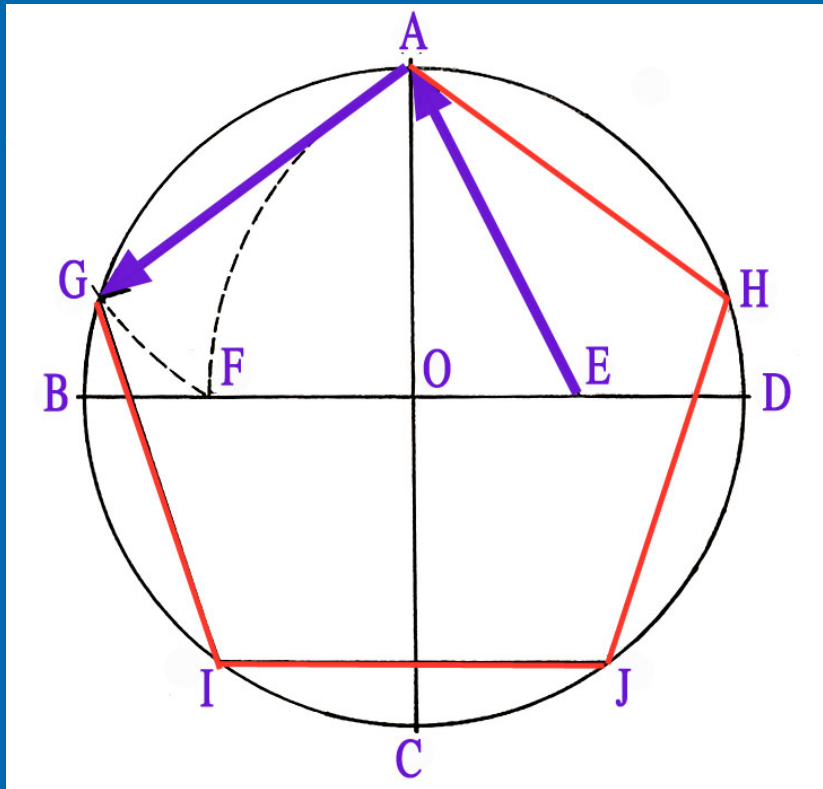


## SG106.3 Chapter 3. Penta Constructions



## SG106.3.1 Ptolemy's Pentagon Construction

In his *Almagest* (Arabic rendition for “the greatest”), astronomer - geographer - mathematician Claudius Ptolemy (2nd c. BCE) gives a geometric construction for the regular pentagon.



**Step #1:** Trace a crossed / 4-directional circle, with center O, vertical axis AC and horizontal axis BD. Mark the midpoint E on OD.

**Step #2:** With center E and radius EA, draw an arc cutting BO in F.

**Step #3:** With center A and radius AF, draw an arc meeting the circle in G.

AG is one side of the inscribed pentagon.

**Step #4:** With same radius AG, draw the other 4 sides of the pentagon around the circle.

**AGIJH is the regular pentagon.**

## SG106.3.2 Dürer's Construction

A little known Sacred Geometry piece of homework by German artist Albrecht Dürer (1471-1528) is his construction of a regular pentagon, which he knew was slightly off (by about half a degree) but is close enough to perfect as the inaccuracy is not visually perceptible. Until recently, engineering books still featured this method.

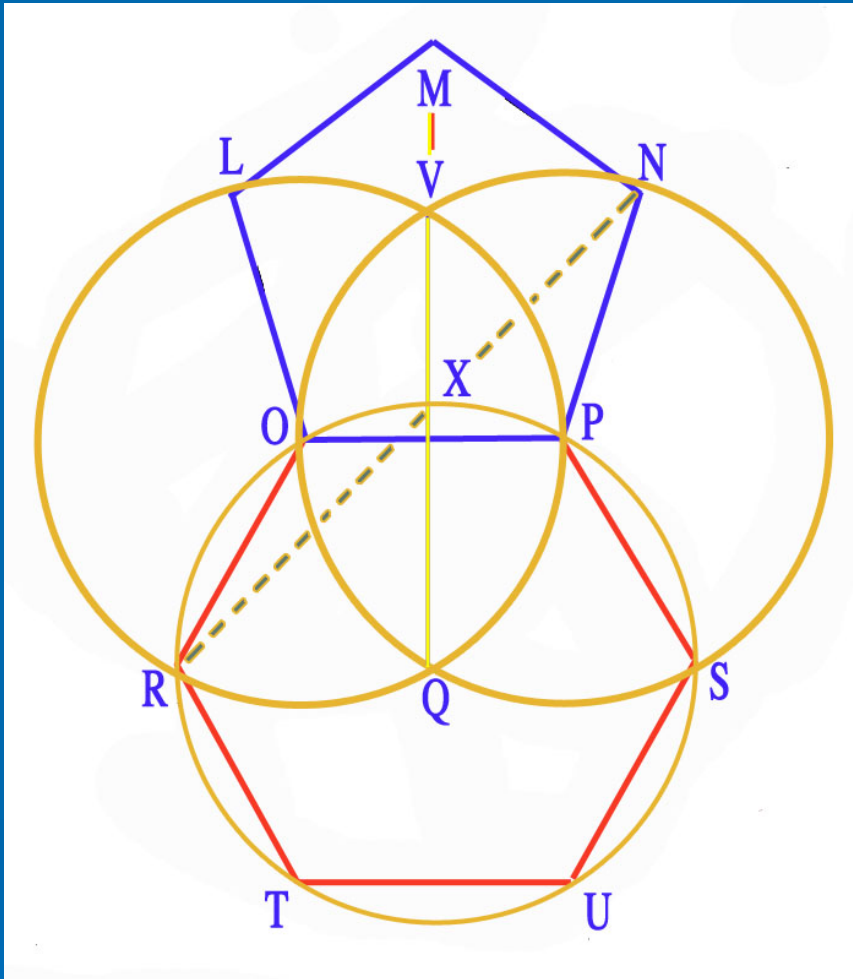
Step #1: Draw two circles, with centers O & P, intersecting each other at their center, thus forming a Vesica Piscis. Draw the vertical axis VQ of the Vesica.

Step #2: Draw a 3rd circle, with center Q and intersecting with the first two circles in R, O P and S. This circle intersects the vertical axis of the Vesica in X.

Step #3: Draw the lines SX and RX and extend them into L & N.

Step #4: Trace the lines LO and NP. These are the two sides of the inscribed pentagon. From Center L, with radius OP, mark the apex M of the pentagon.  $LO = PN = NM = ML = OP$ .

Step #5: With radius OP as a side, Trace OR, RT, TU, US and SP as the 6 sides of the inscribed hexagon.



Note that this construction is performed “*with the opening of the compass unchanged*”.  
This is the ultimate elegance in Sacred Geometry.  
It also unites (“weds”) together the Pentagon and the Hexagon, through the Vesica.

## SG106.3.3 The Mystical Wedding Penta-Hexa

In Sacred Geometry, there are spiritual exercises using the figuration of geometric symbolism to point to inner, mystical, alchemical transformations. The Wedding of 5 and 6 is one of them. Another one is the Squaring of the Circle.

In his *Dimensions of Paradise*, John Michell explains:

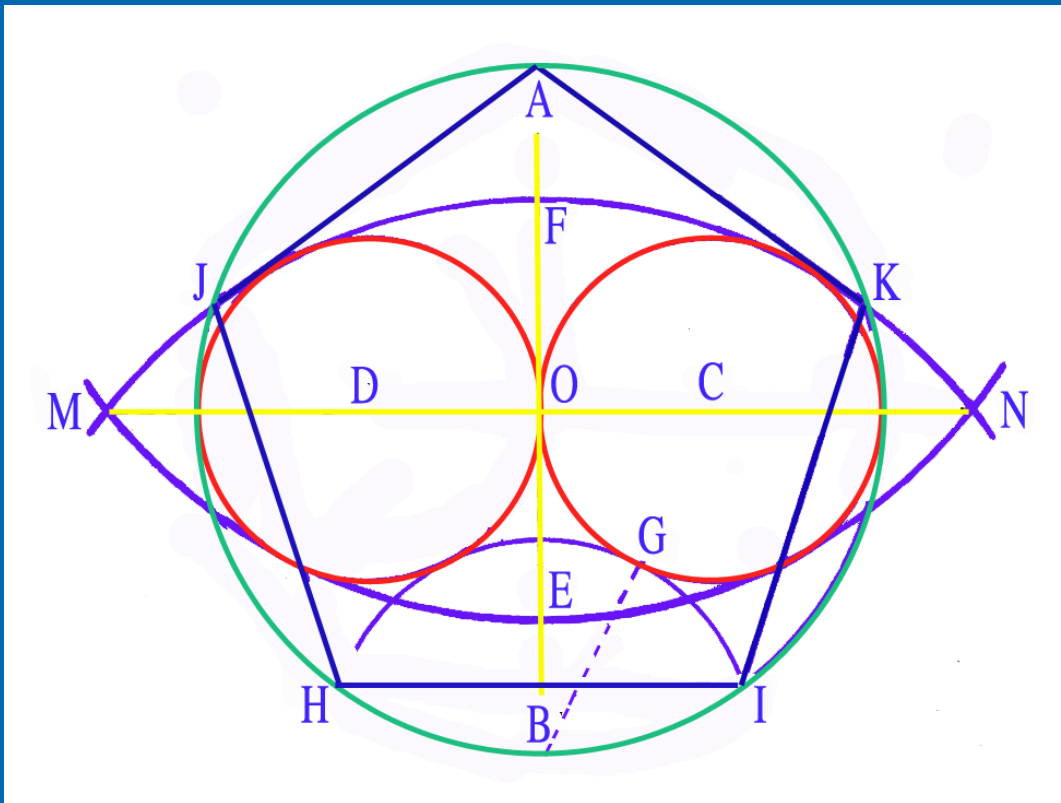
*“Psychic and lunar are the qualities of the Pentagon, whereas the hexagon is rational and solar. The dimensions of the solar system are displayed in units of six, and the hexagon is behind inanimate forms such as the snowflake and the crystal. The 3 angles of an equilateral triangle, six of which make an hexagon, are each 60 degrees, reflecting the solar number 666, while between two sides of a pentagon the angle is 108 degrees, 1080 being the characteristic lunar number...”*

In Pythagorean number symbolism, the Pentad 5 is the “Nuptial Number” and the Hexad 6 is the “Cosmos” number. These symbolize the dual human nature: the bodily incarnated “Vitruvian / Da Vinci” human (the pentagram expanding its arms to touch the circle in 5 points) and the heavenly spiritual soul (the hexagram fusing the celestial energies of the downward-pointing yin triangle and the terrestrial energies of the upward-pointing yang triangle. In 3D, the hexagram is the double-tetrahedron or Star-Tetrahedron.

In combination, the two figures symbolize the journey of unification between man and cosmos. Five is the microcosm and Six the macrocosm.  $5 + 6 = 11$  or double unity. Man as Angel: the next evolutionary code.

The harmonious reconciliation and integration of the two principles 5 and 6 is a spiritual realization. This “*mystical wedding*” is achieved, in Sacred Geometry, by means of the Vesica Piscis, the traditional Womb of Creation or, in contemporary terms, the inter-dimensional stargate, which is also the shape of the Third Eye.

## SG106.3.4 Yin-Yang Pentagon Construction



Step 1: Draw the initial “unity-circle”,  
With center O and radius  $OA = OB$ .

Step#2: Trace two inner circles with radius  
 $OD = OC$ .

Their circumference is equal to the  
circumference of the initial circle but their  
area is equal to only half the area. The  
unity-circle has thus been horizontally  
divided by the yin-yang sine-wave.

Step #3: From A and B, with radius AE &  
BF, trace two arcs tangent to the two inner  
circles., intersecting each other at M & N  
and cutting the unity-circle in J & K.

Step #4: With point of compass on B and radius BG, trace a arc tangent to the two inner circles and intersecting the  
unity-circle in H & I.

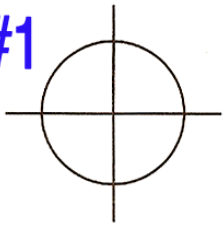
The five points AKIHJ  
are the five vertices of the pentagon inscribed in the initial unity-circle

*“Given in the original division or scission of the unity-circle into two halves is the plan of return, the  
pentagon, the symbol of life, with its 5-fold (golden) symmetry.*

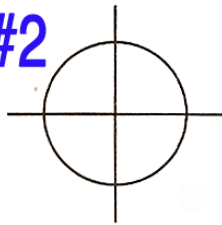
*Therefore, the initial division simultaneously carries with it a teleological message about Life as a  
force of levity and return toward the light, as we see in plants which grow back toward the radiant  
energy source they embody”.*

*Robert Lawlor*

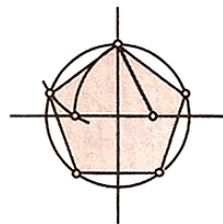
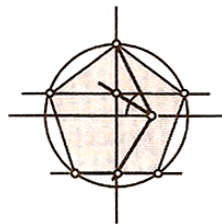
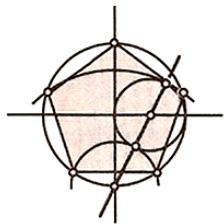
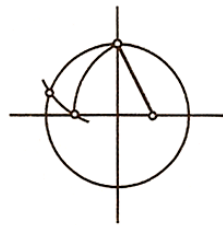
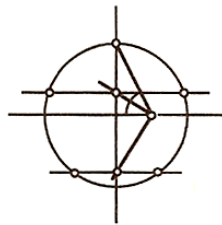
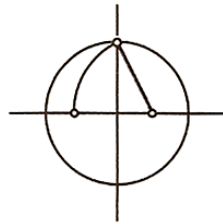
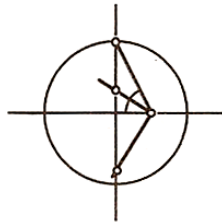
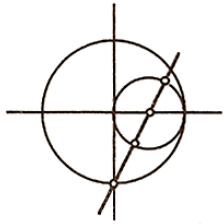
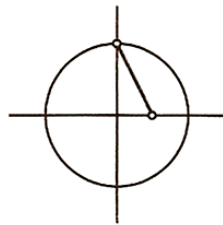
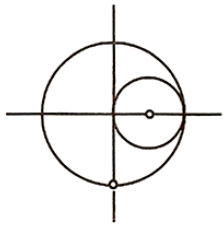
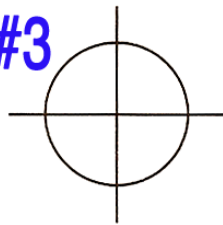
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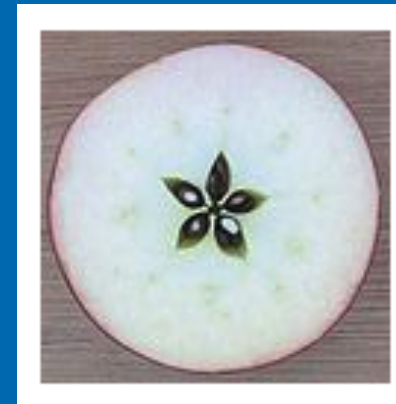
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#3

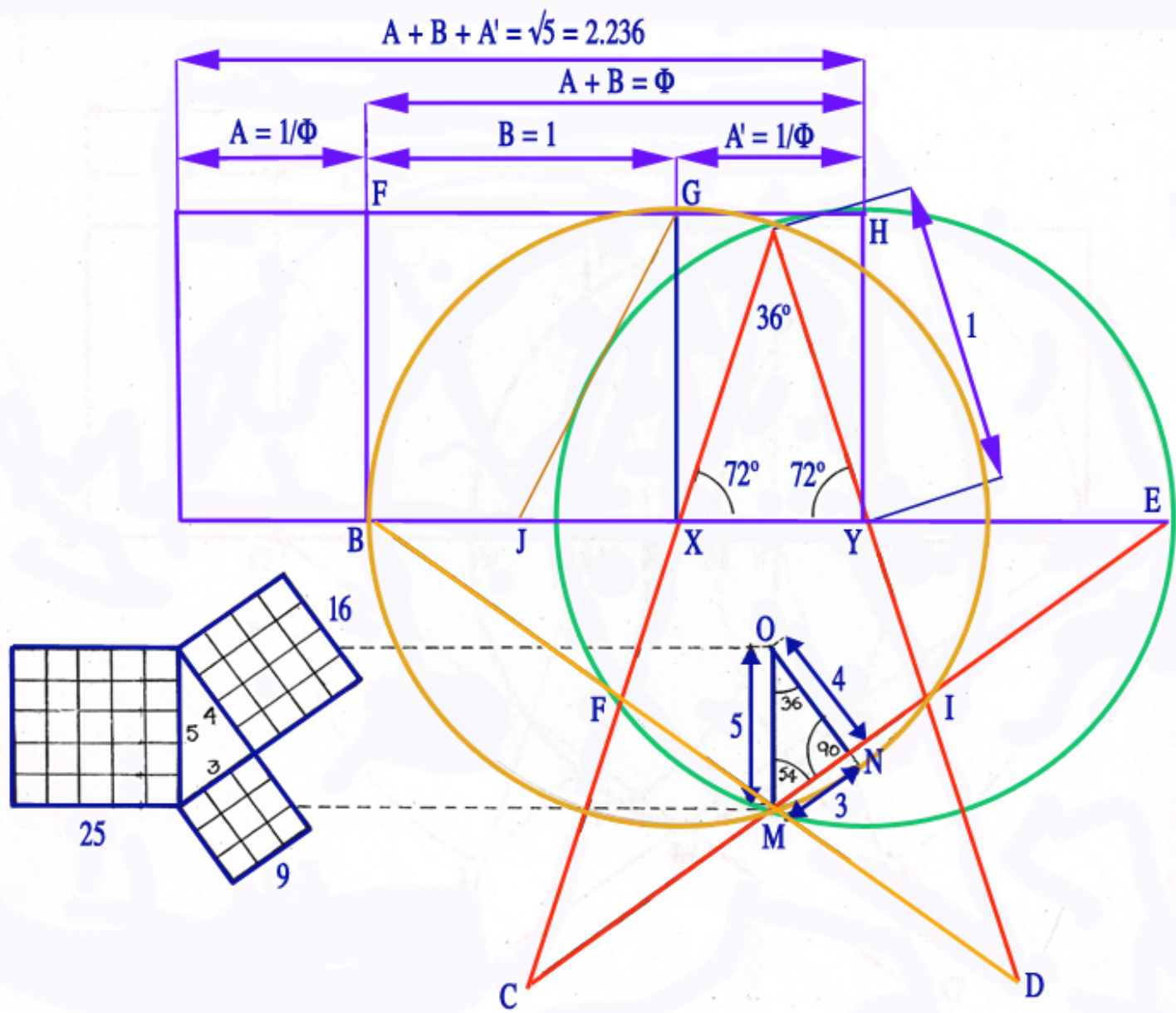


## SG106.3.5 Pentagon Constructions with Circles



The *gynoecium*  
of an apple  
contains five *carpels*,  
arranged  
in a five-pointed  
star.  
(Wikipedia)

(After Hans Walser.  
*The Golden Section*. MAA. 2001)



SG106.3.6.1 Pentagram Construction with Golden Rectangle (1)



## SG106.3.6.2 Pentagram Construction with Golden Rectangle (2)

*PRACTICE: Print the preceding page*

1. On your grid paper, trace the original square BFGX. Mark the mid point of BX at J.
2. Trace the diagonal to G and, with your compass point at J, bring the arc to the base line BE. The Golden Cut is at Y.
3. Follow these steps:

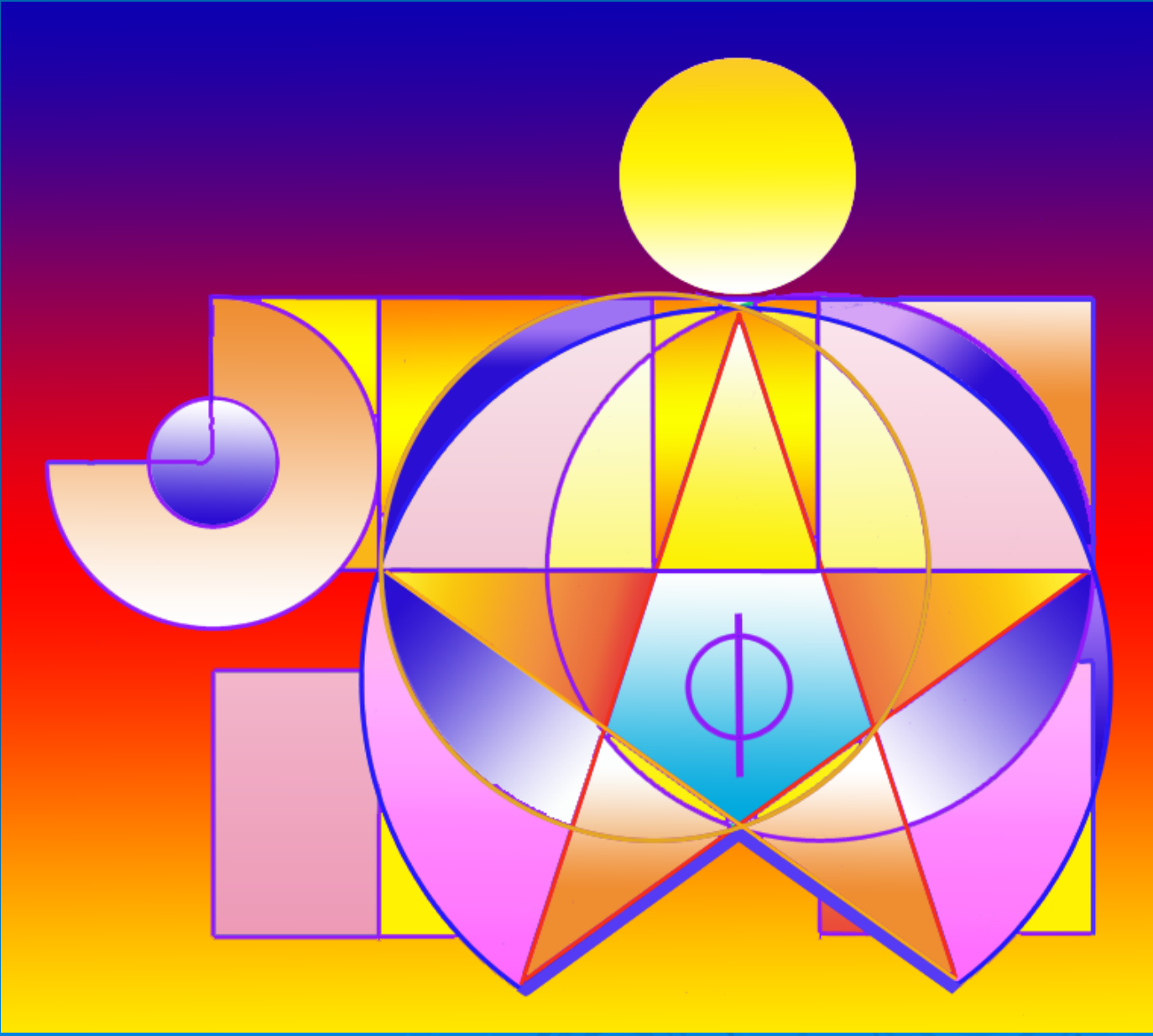
Step #1: Trace the larger Golden Rectangle BFHY containing the smaller Golden Rectangle XGHY.

Step #2: With centers X and Y and radii  $XB = YE = 1$ . Trace two full circles (orange and green) intersecting in A & M. A is the apex of the pentagon's top Golden Triangle.

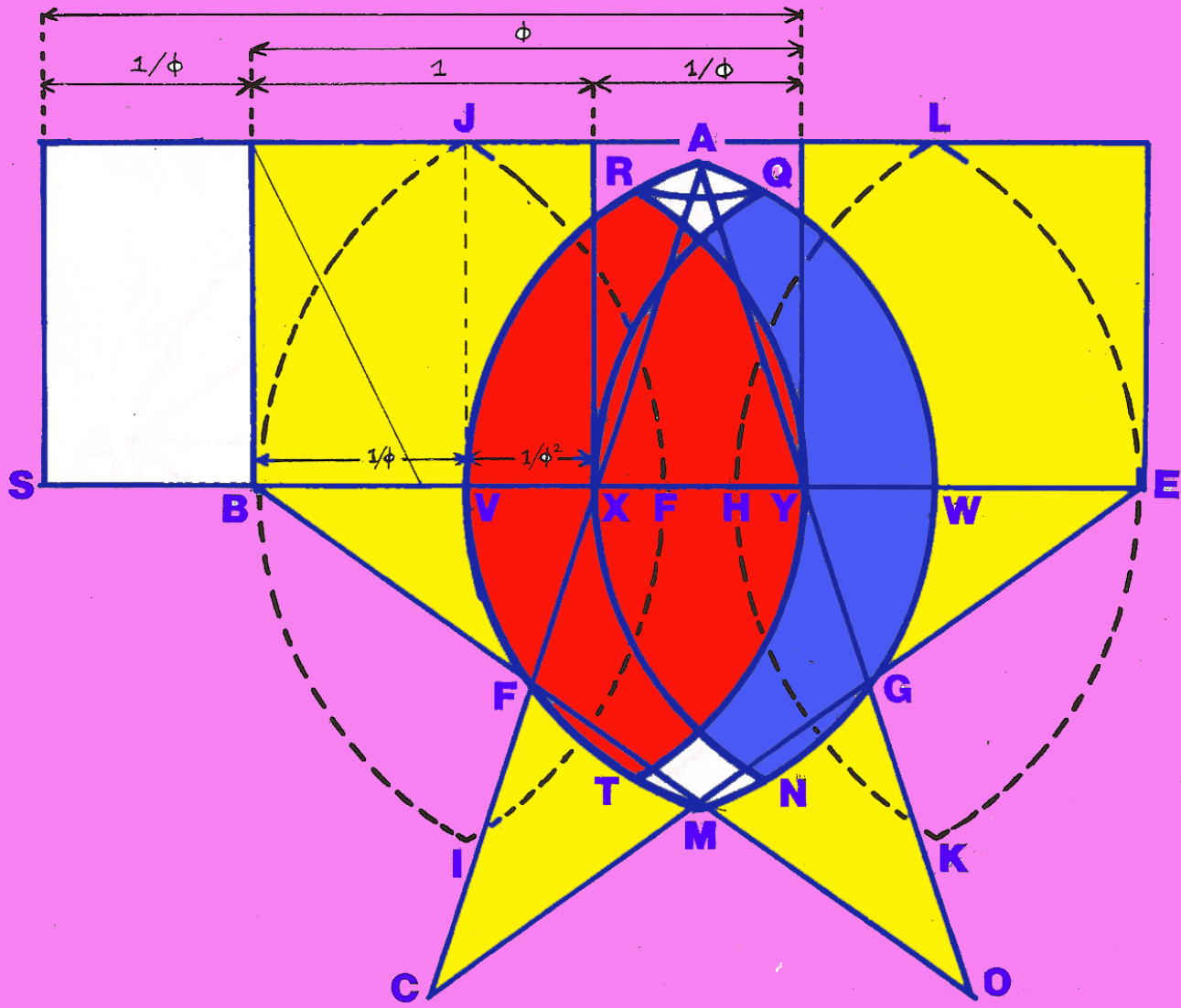
Step #3: Trace BM intersecting the green circle in F.

Step #4: Extend BM, EM, AF & AI with radius  $BX = AX = AY = YE = 1$  to obtain the other Golden Triangles of the pentagon AEDCB.

The triangle OMN is a 3-4-5 Pythagorean triangle, as proven by the adjacent geometry of the squares. It is also half of the Golden Gnomon.



**SG106.3.6.3 Pentagram Construction  
with Golden Rectangle (3)**



sg106.3.7.1 Pentagram Construction  
 with Vesicas (1)

## SG106.3.7.2 Pentagram Construction with Vesicas (2)

*PRACTICE: Print the preceding page*

1. On your grid paper, draw the Golden Rectangle and Pentagram as before.
2. Trace the various Vesicas according to these instructions:

Two “true” Vesicas: RYTV & QWNX  
(long axis =  $\sqrt{3}$ , short axis = 1)

Step #1: With the compass point at X and radius XA, trace the arc QWN.  
With point at Y, trace the arc RVT.

Step #2: With point at V and same radius (VY = YA = XA), trace the arc RYT.  
With point at W, trace the arc QXN.

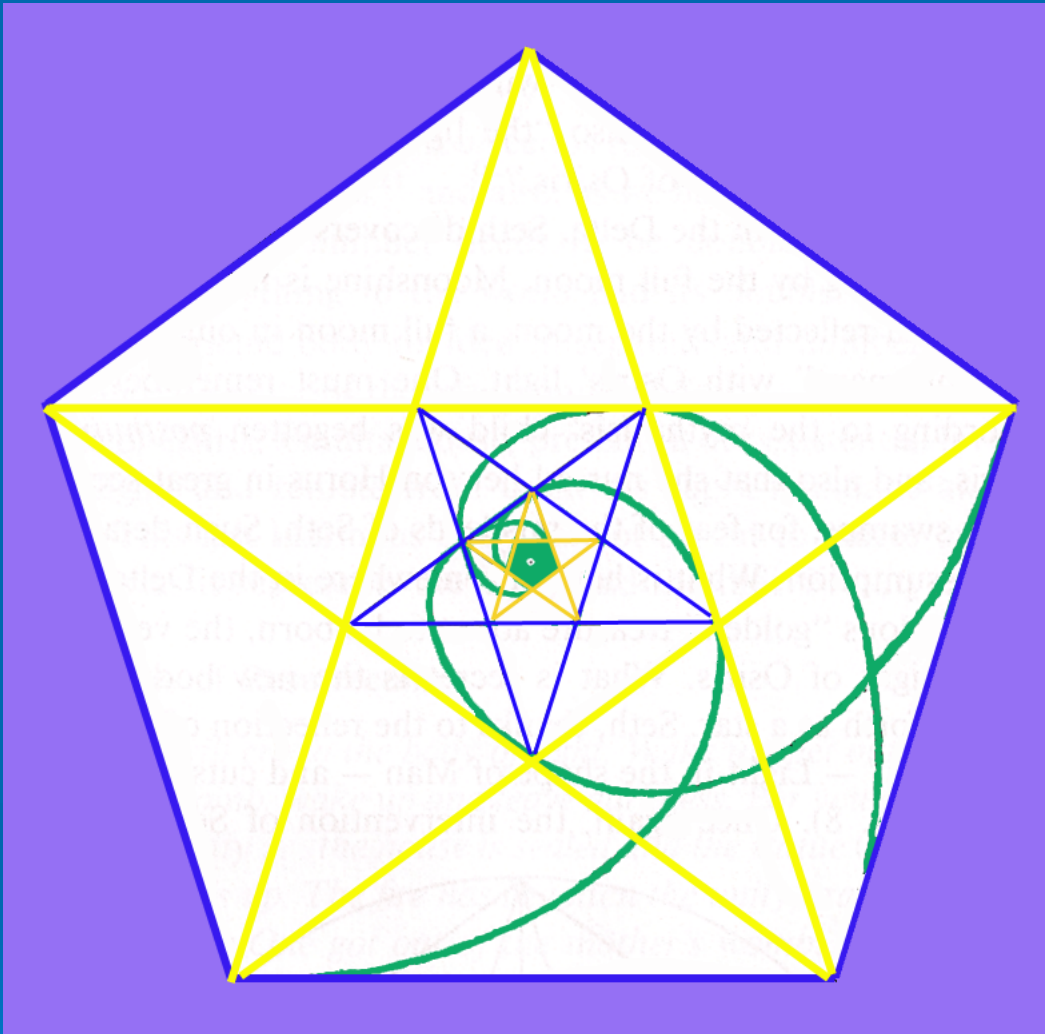
Two “Golden” Vesicas: JFIB & LEKH  
(long axis = 2, short axis =  $1 + 1/\Phi^3 = 1.236$ )

These are marked with dotted lines and are traced from B & F and H & W respectively.

One “Ovo” Vesica: AWMV

Cuts the baseline SE in V & W such as:  $BV / VX = EW / WY = 1 / \Phi$  over  $1 / \Phi^2$   
The Ovo-Vesica is partly formed by the two outer sides of the true Vesicas.

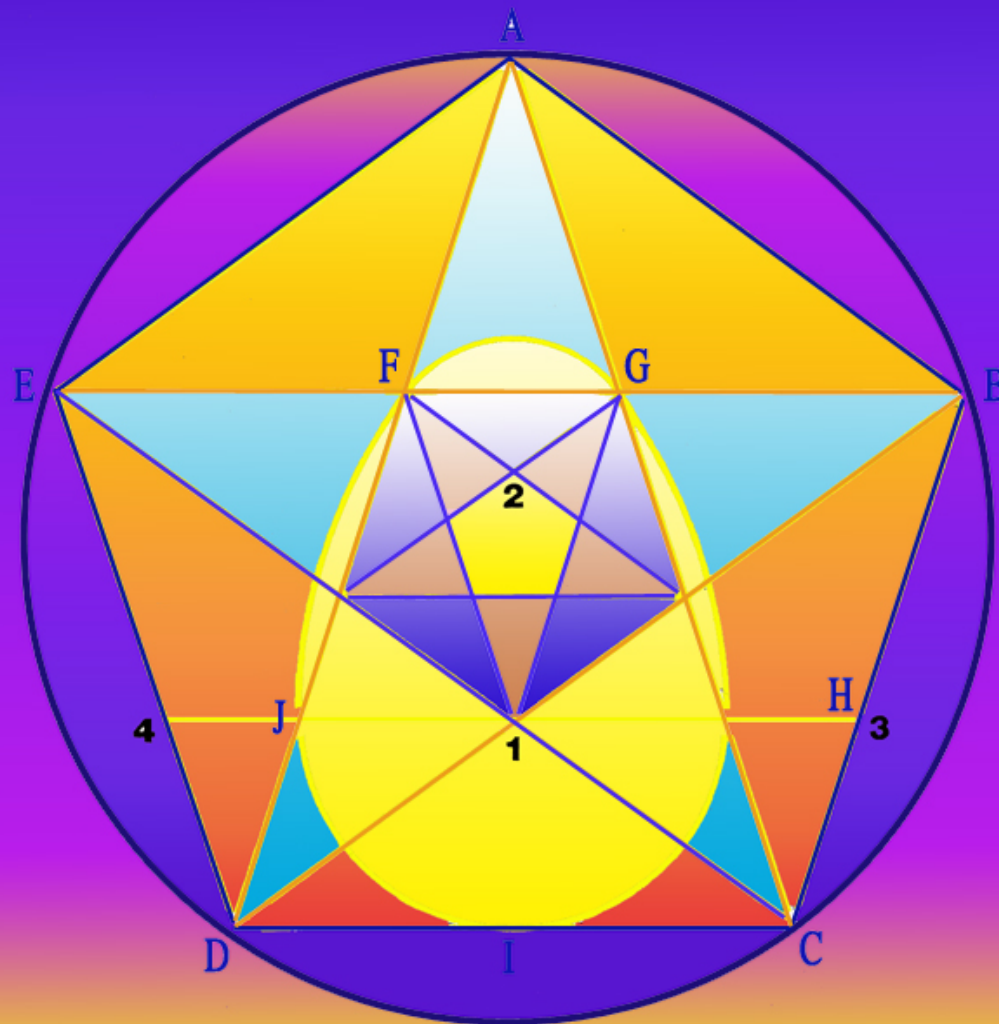
## SG106.3.8. Spirals in the Pentagram



Golden PHI Spirals can be traced from “whirling pentagrams”, just like they can be traced from “whirling squares” and “whirling triangles”.

The same PHI Ratio applies in all Golden Spiral constructions.

## SG106.3.9 The Cosmic Egg in the Pentagon



**Step #1:** Trace a regular pentagon ABCDE. Trace the diagonals AC, BD, CE, DA and EB.

**Step #2. Base of Egg:** From 1, with radius 1C, trace HIJ.

**Step #3. Top of Egg:** From 2, with radius 2F, trace FG.

**Step #4. Sides of Egg:** From 3 and 4, with radii 3J and 4H, trace JF and GH.

(After R. Vincent.  
*Geometry of the Golden Section.*)

## SG106.3.10.1 The Quine's Golden Geometries (1)

Traditionally, the Cubit (*"sacred"* or *"royal"* = 0.5236 meter) was the standard for the harmonic series of measures linked with the Golden ratio growth progression.

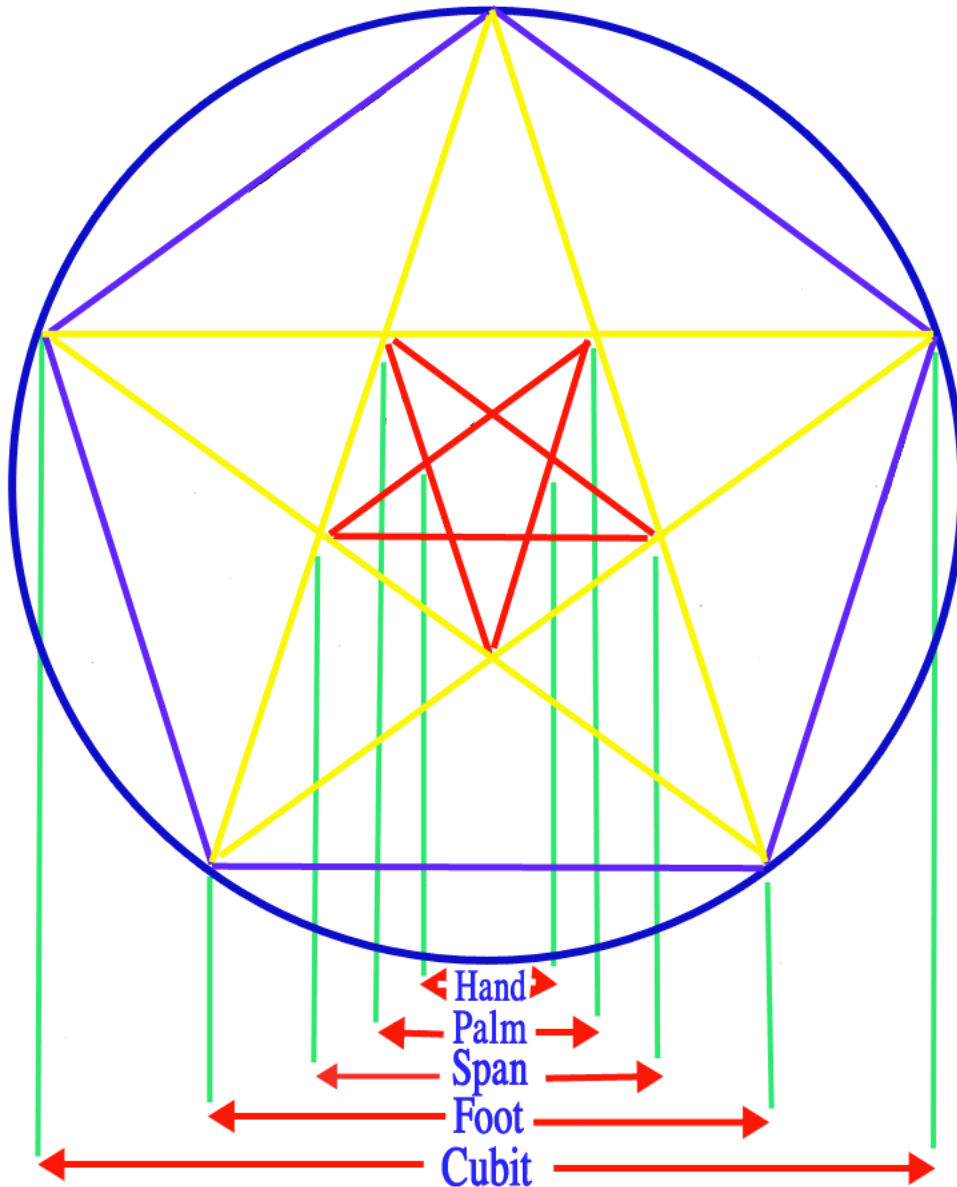
$$\text{Hand} = 1 / \Phi^2$$

$$\text{Palm} = 1 / \Phi$$

$$\text{Span} = 1$$

$$\text{Foot} = \Phi$$

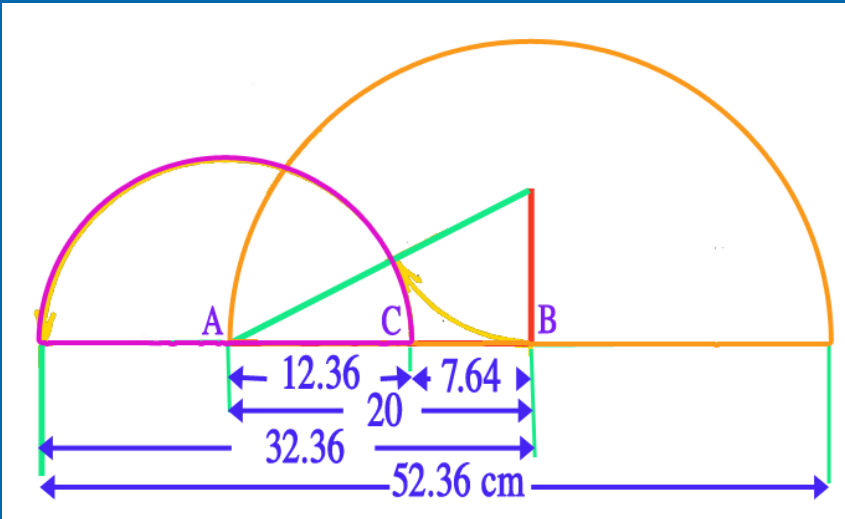
$$\text{Cubit} = \Phi^2$$



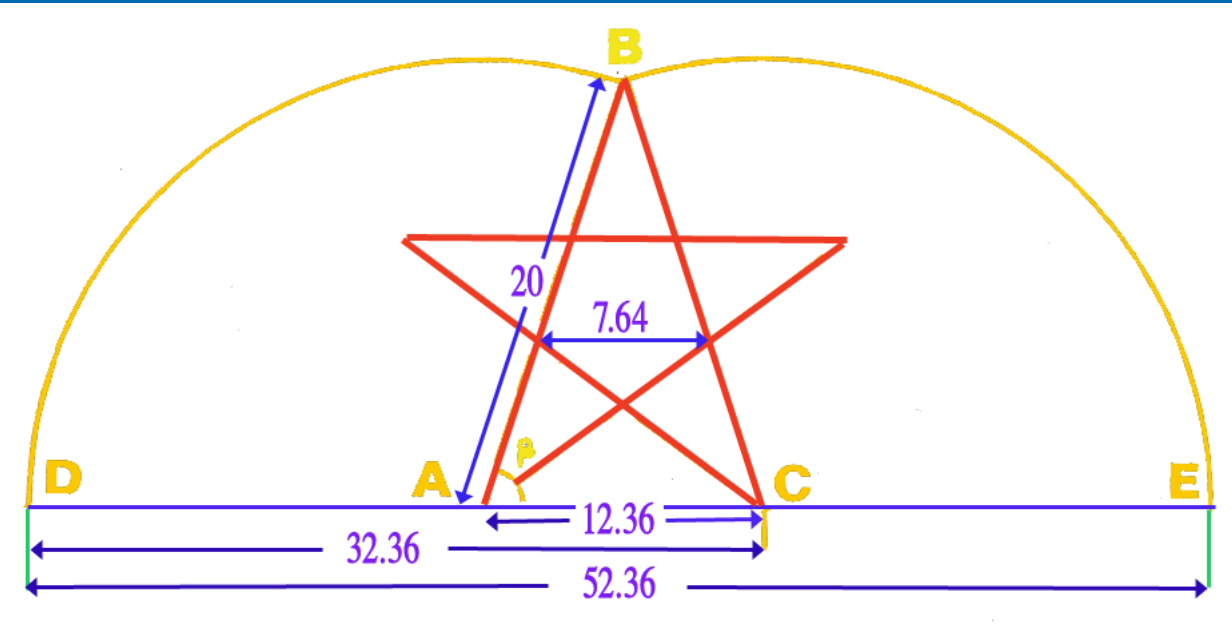
## SG106.3.10.2 The Quine's Golden Geometries (2)

In body reality, an average cubit is smaller than the Royal/Sacred unit. Also the “Maitre d’oeuvre” (architect) would often standardize his measuring rod according to his own body’s measurements.

But, regardless of actual measurements, the proportions between units remain constant and in harmonic resonance with Nature’s Golden Template.



↑ Divide AB into Golden Cut at C  
and trace the multiples of PHI.  $12.36 / 7.64 = \Phi$

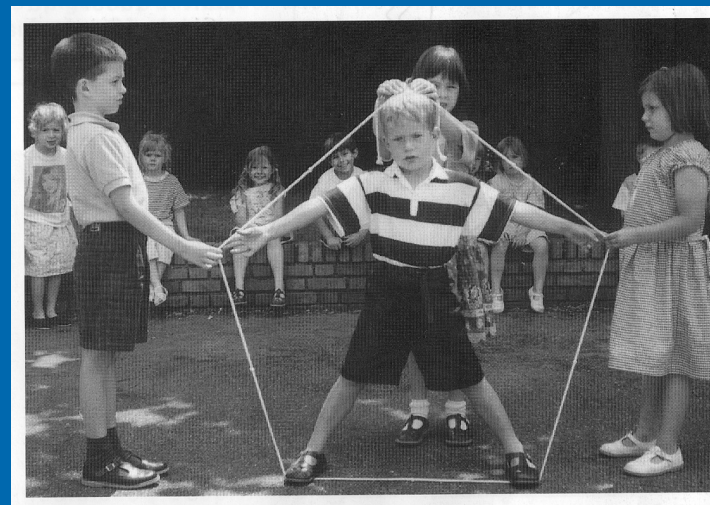
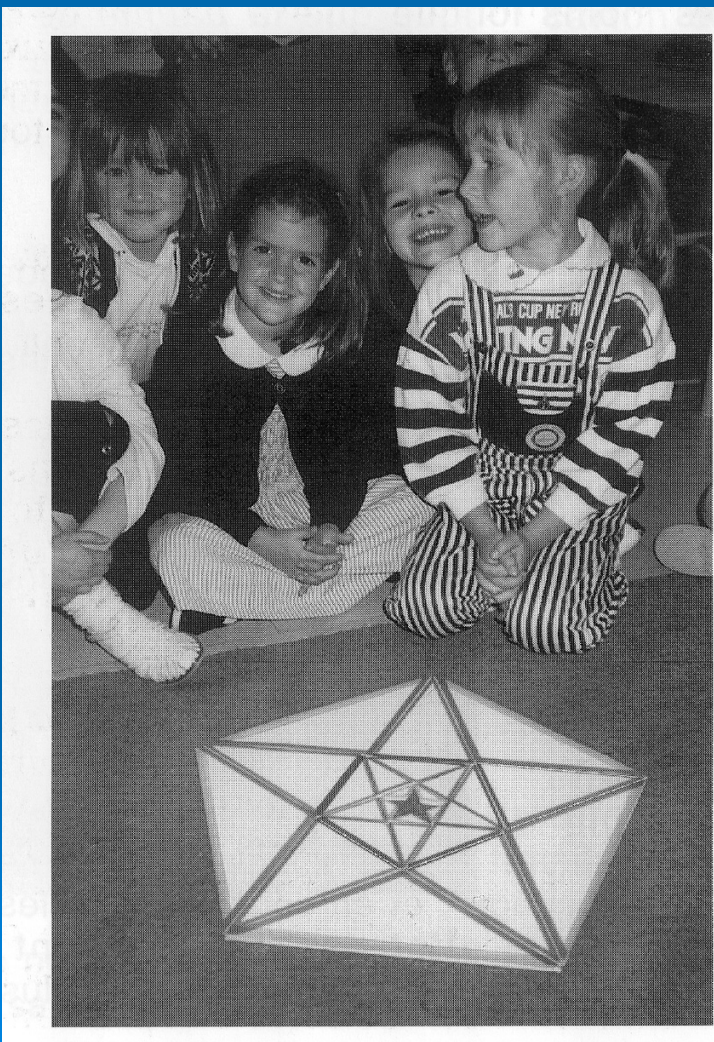


← Draw two arcs from centers A and C, with radius  $DA = CE$ .

$AB = 20$ , angle  $\beta = 72^\circ$   
 $AC = 2AB \cos \beta = 12.36$



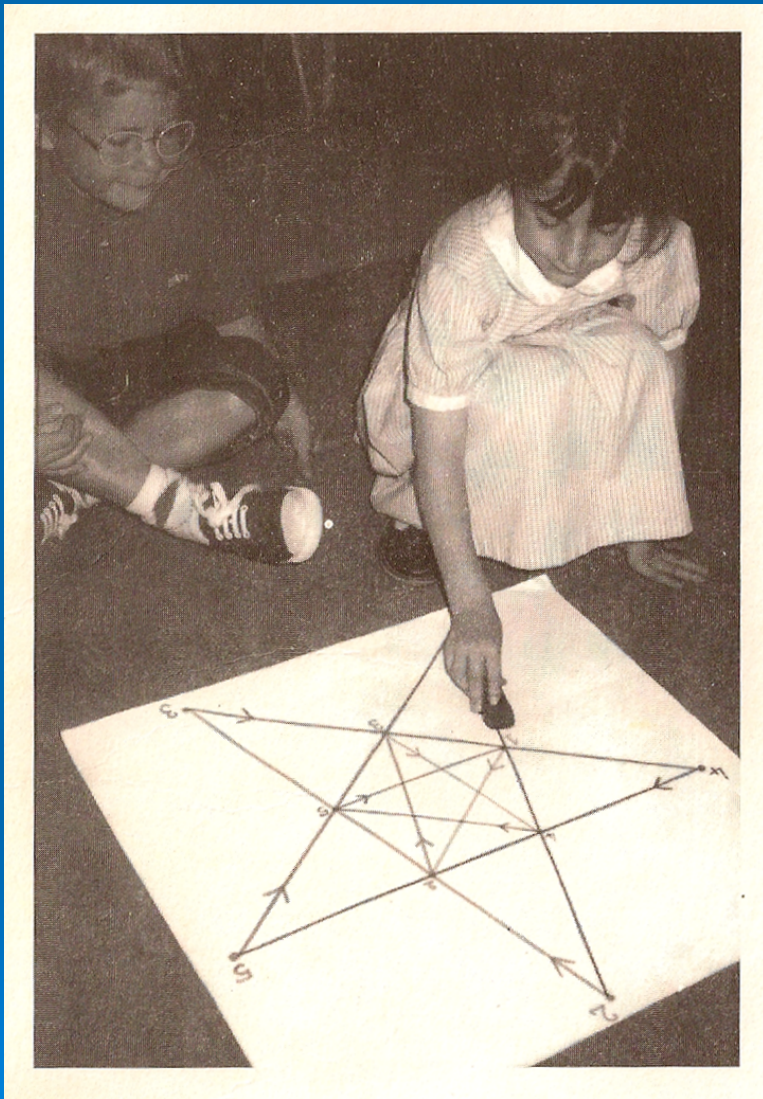
## SG106.3.11.1 Penta Plays & Games (1)



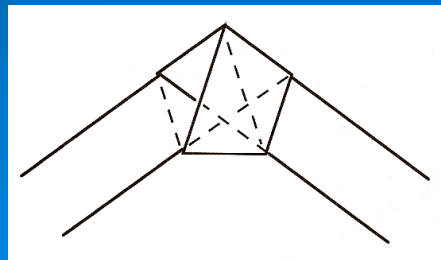
Images: Mireille Hibon. *L'Enfant et le Nombre d'Or.*

## SG106.3.11.2 Penta Plays & Games (2)

Images: Mireille Hibon.



## SG106.3.12 The Penta Knot

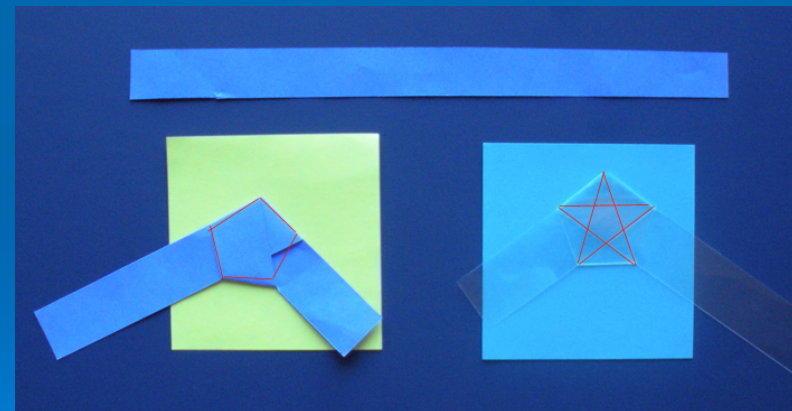


I always thought that tying up a knot or a strip of material was a pretty random event.

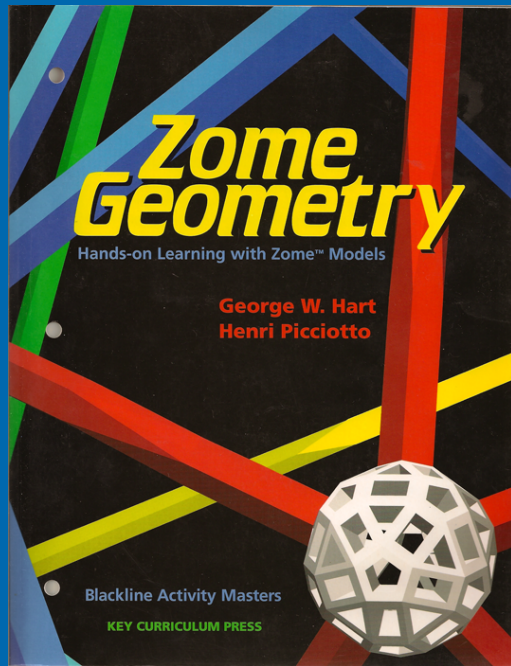
Not so. Try tying up a strip of paper into a simple knot. Lo & behold, the Pentagon appears!

Moreover, if you cut a long strip in a transparency type of acrylic (transparent and semi-rigid), you will see the inner structure of the pentagon i.e. the pentagram.

Golden Magic in everyday life!



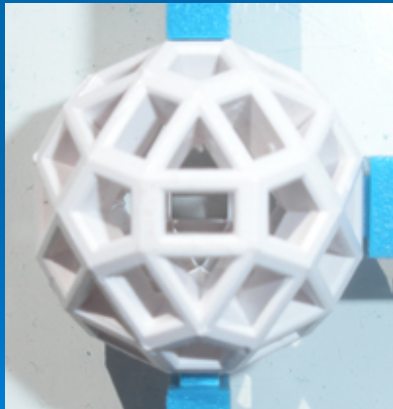
## SG106.3.13 Zometool Models



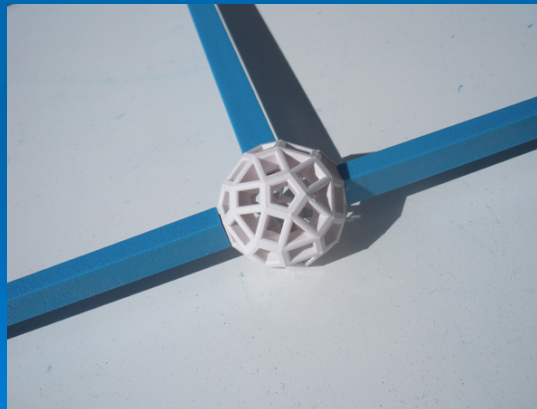
The Zometool toys are a perfect sacred geometer's discovery system.

Built around a spherical connector hub/node with 62 access points, the Zometool system is based on the mathematical building blocks of nature: 2, 3- and 5-fold symmetry and the Golden Proportion.

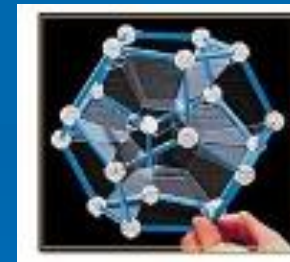
Used by kids as well as research scientists, the Zometool system fosters an appreciation for the uniqueness and beauty of nature as expressed in geometry through the use of the Zometool nodes and sticks.



A Golden Rectangle with 2 pentagons (left & right) and 2 equilateral triangles.

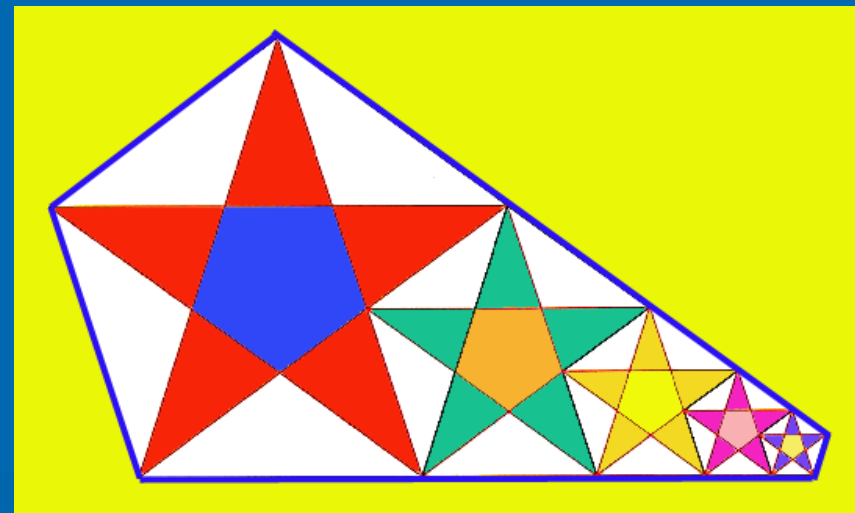
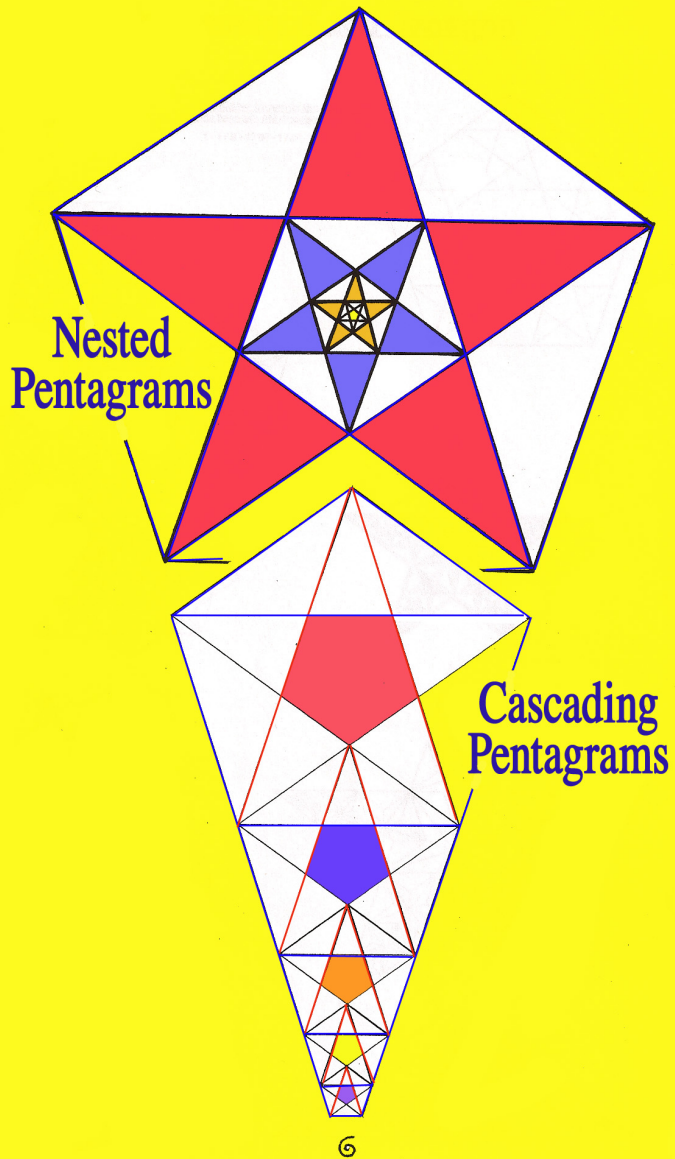


A pentagon surrounded by 5 Golden Rectangles.



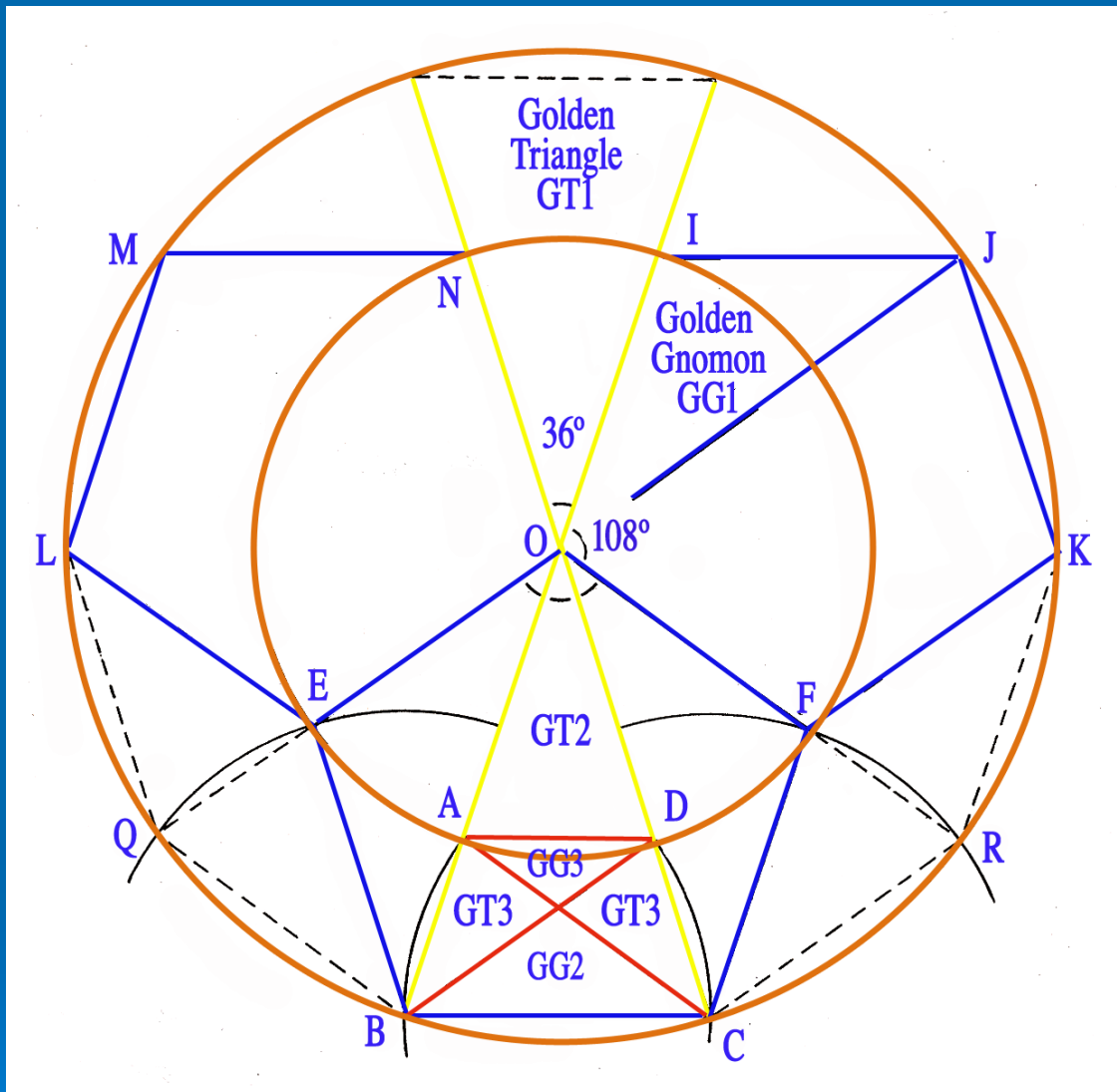
[www.zometool.com](http://www.zometool.com)

## SG106.3.14 Self-replication of Pentagrams



*“... like families of angel stars hugging each other...”*

## SG106.3.15 Pentagon Summary Design



Trace the Golden Triangle OBC with base  $BC = 1$  and two sides  $OB = OC = \Phi$ .

Trace Golden Triangle daughter ACB, with point of compass on C and radius BC.

Same for Golden Triangle daughter DBC.

From center O, trace outer circle with radius  $OA = OD = 1$ .

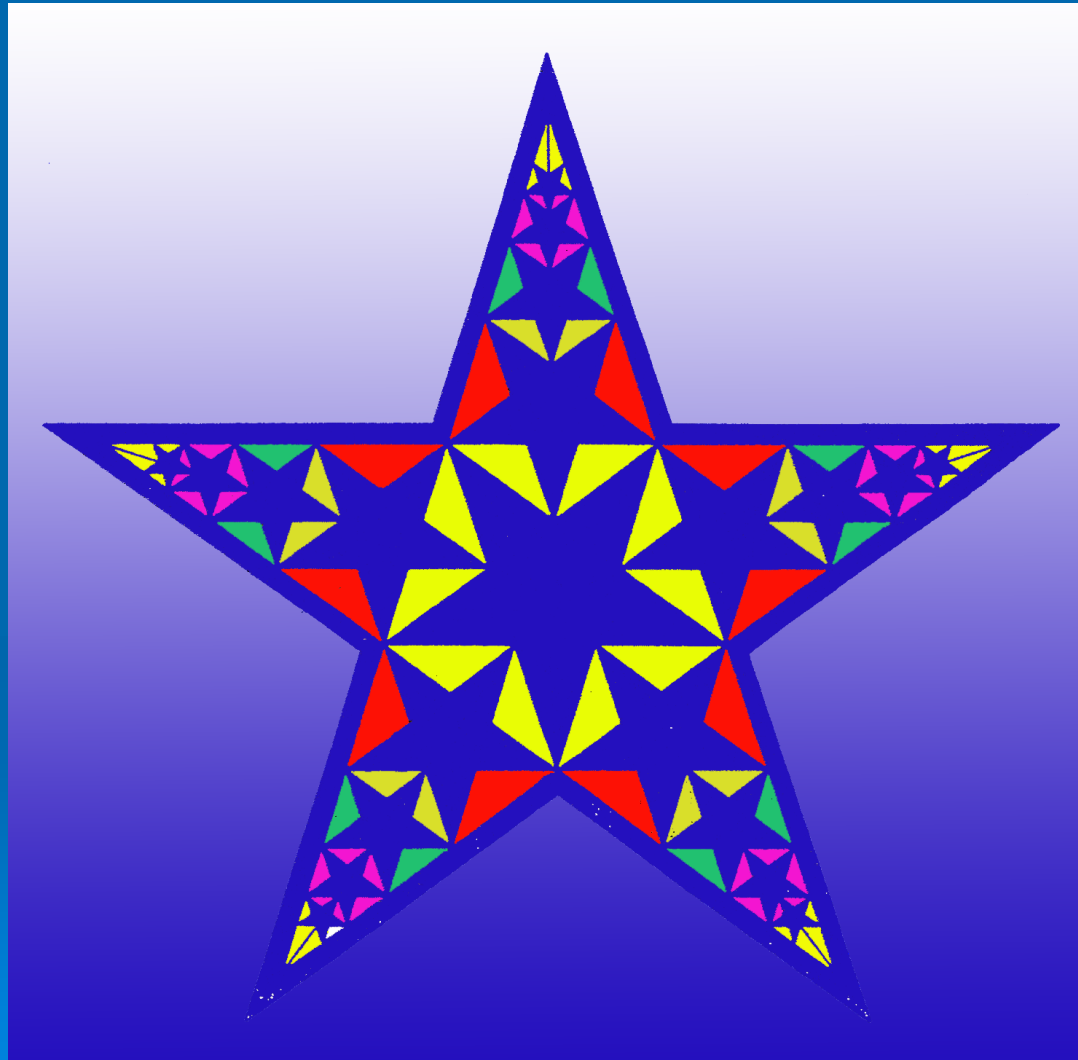
Then trace inner circle with radius  $OB = OC = 1$ .

Note: LEBQ and KFCR are examples of Golden Rhombi i.e. two large Golden Triangles base to base.

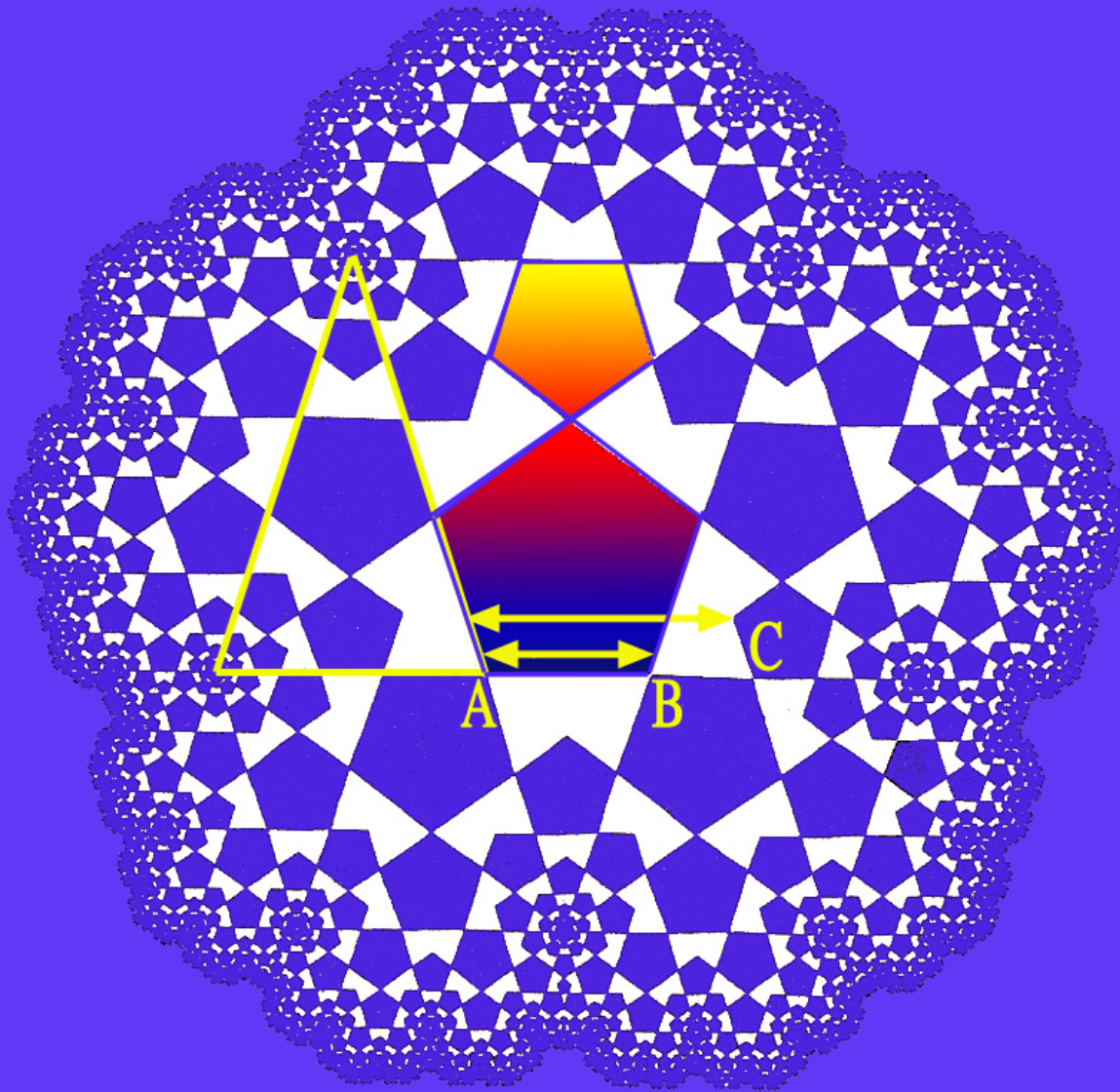
The construction shows two penta-modules in 3 sizes:

- largest, large and small Golden Triangles (GT1, GT2, GT3)
- largest, large and small Golden Gnomons (GG1, GG2, GG3)

## SG106.4. Chapter 4. Penta Symmetries



SG106.4.1.1  
**Penta  
Fractals (1)**



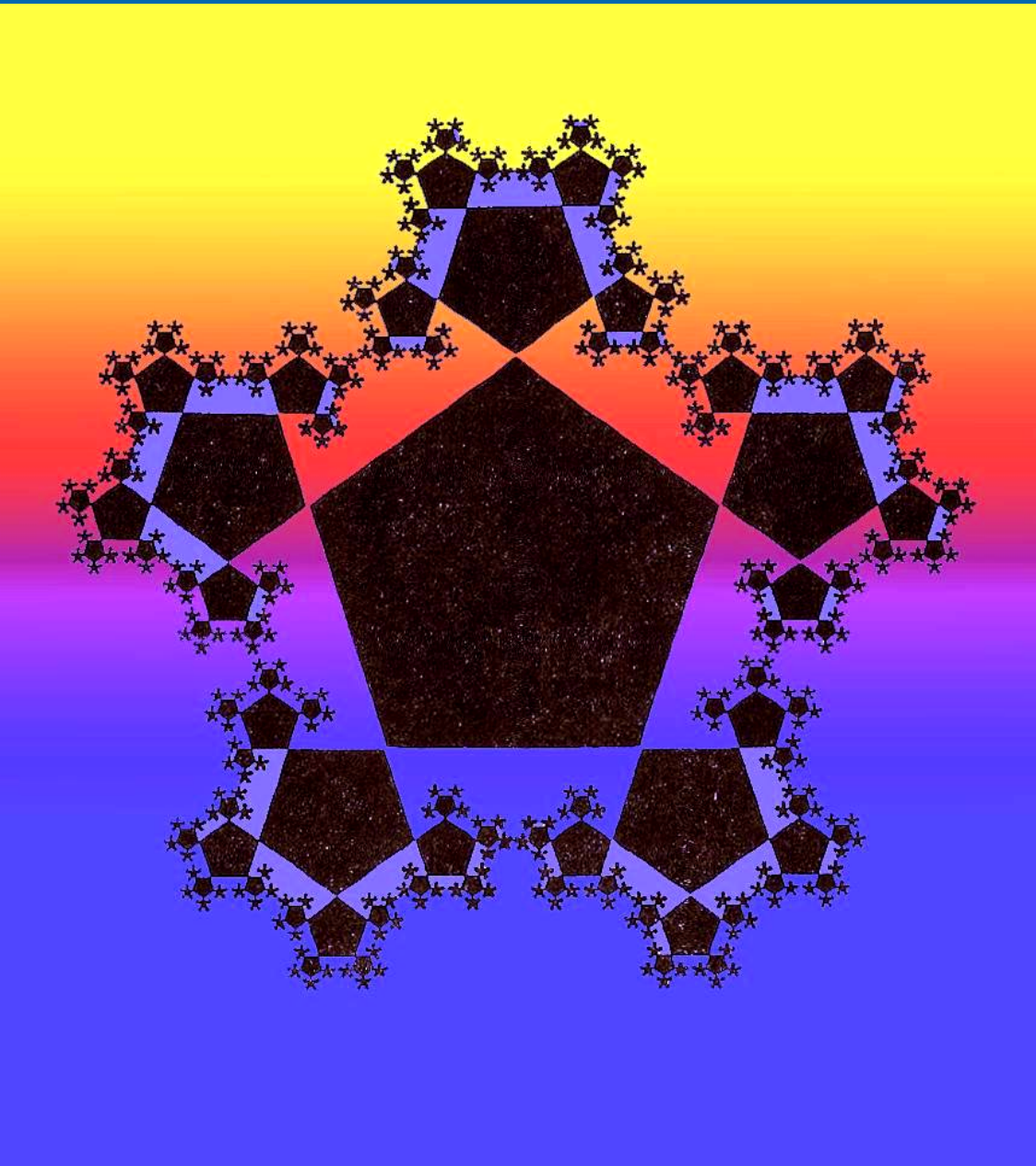
$$\begin{aligned} AB &= 1 \\ BC &= 1/\Phi \\ AC &= \Phi \end{aligned}$$

(B & W images this page  
& next two pages:  
Hans Walser.  
*The Golden Section*. 2001)

**Reduction factor**  
 $f = 1/\Phi = .618$



SG106.4.1.2  
**Penta  
Fractals (2)**

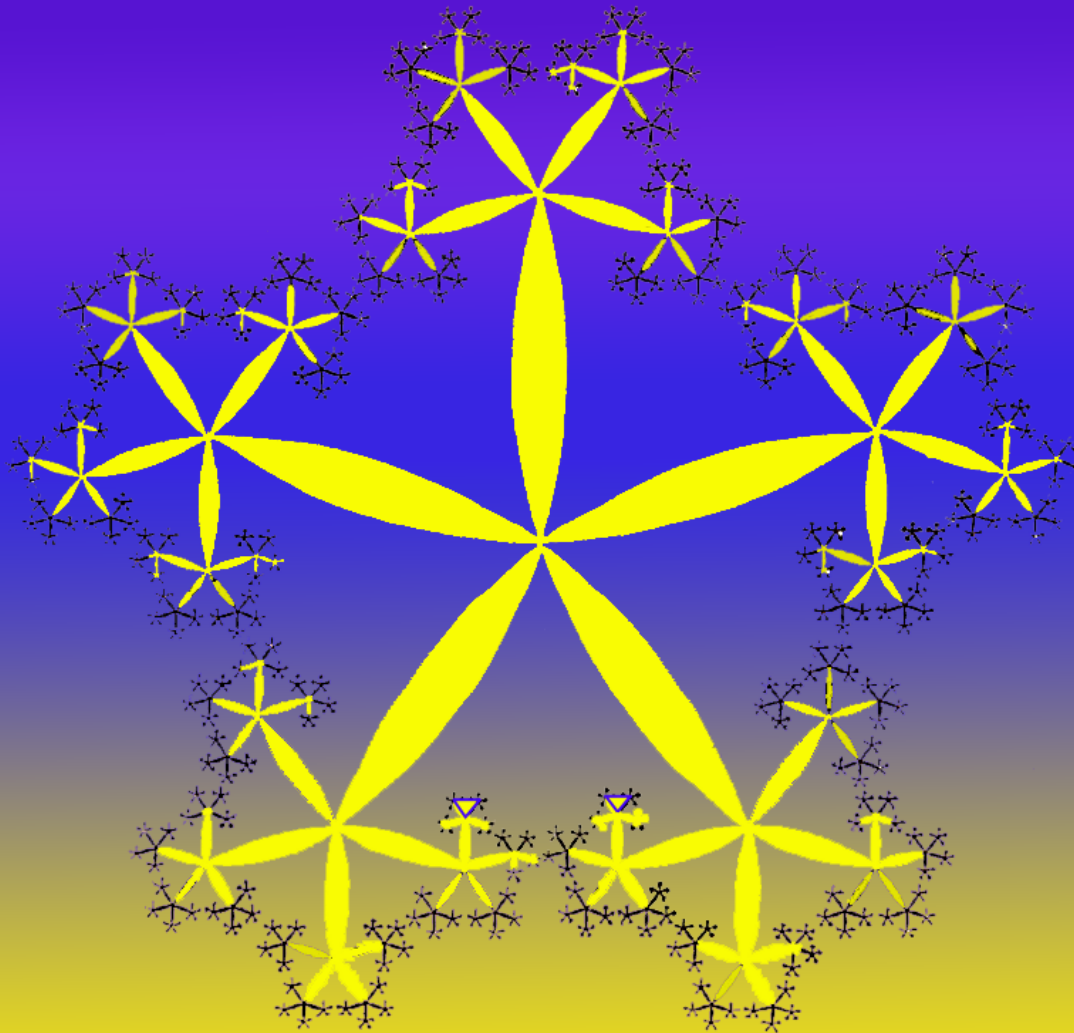


Reduction factor  
 $f = (1/\Phi)^2 = .382$

SG106.4.1.3

## Penta Fractals

(3)

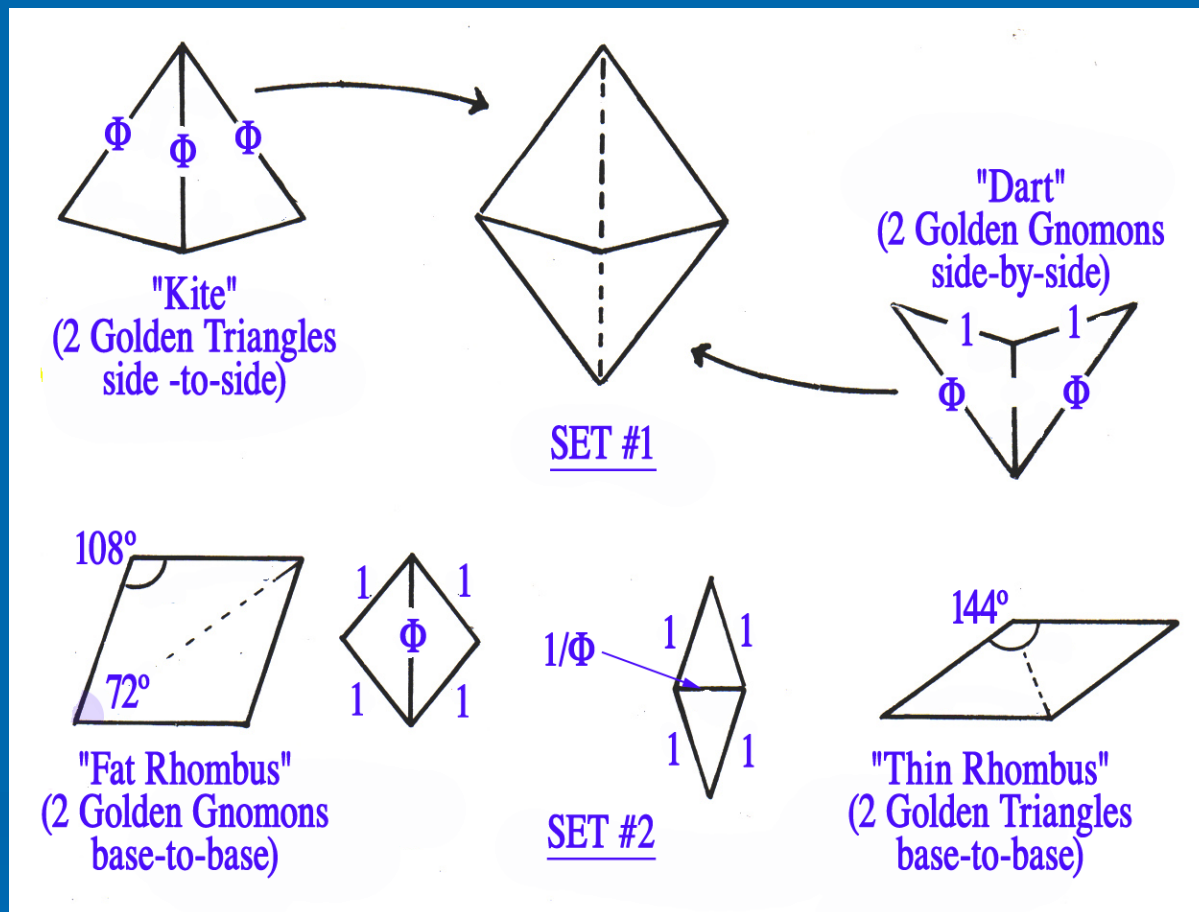


Reduction factor  
 $f = (1/\Phi)^2 = .382$

## SG106.4.2.1 Penrose Tiling (1)

Although regular pentagons cannot tile the plane, Roger Penrose, while playing with tiling problems, rediscovered (1974) two sets of tiles that nicely do the job. They are called the “*dart*” and the “*kite*” (set #1) and the “*fat rhombus*” and “*thin rhombus*” (set #2).

These two sets of tiles are in fact subdivisions of the Pentagon’s primordial Penta-Modules: the Golden Triangle and the Golden Gnomon. If certain matching rules are followed, the two sets tile the plane non-periodically.



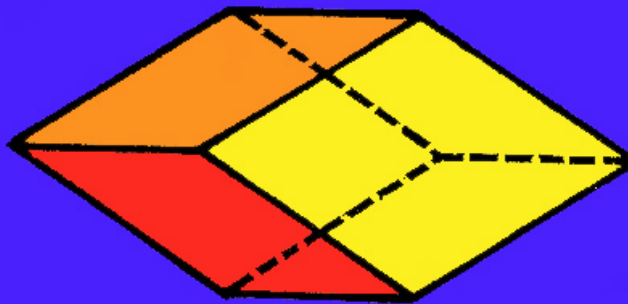
A unique “golden” property of the Penrose Tiling is:

$$N_{\text{kites}} / N_{\text{darts}} = \Phi \quad \text{and} \quad N_{\text{fat}} / N_{\text{thin}} = \Phi$$

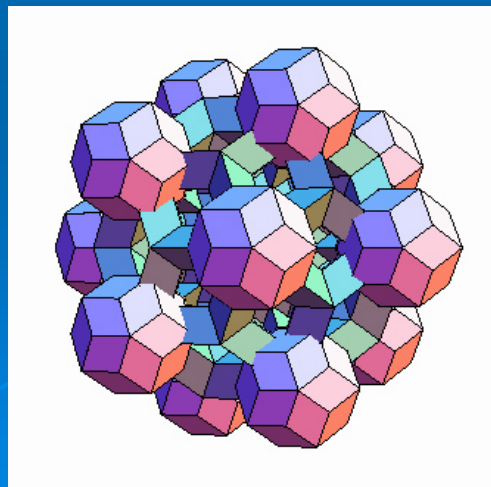
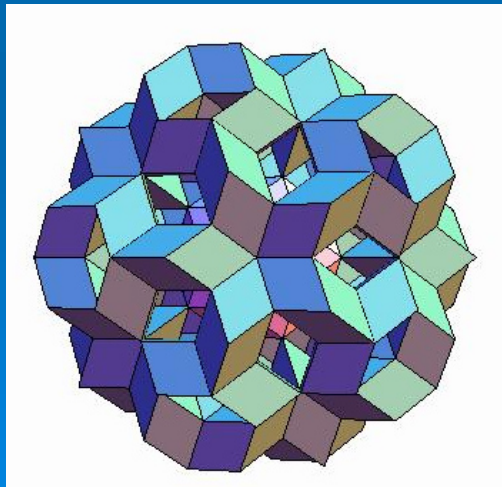
- The number of “*kites*” is 1.618 (=  $\Phi$ ) times the number of “*darts*”.
- The number of “*fat rhombi*” is 1.618 (=  $\Phi$ ) times the number of “*thin rhombi*”.

## SG106.4.2.2 Penrose Tiling (2) Golden Rhombohedron

In 1976, Robert Ammann extended Penrose's work into 3D and (re)discovered two golden volumes that "tile in 3D", and fill up space without any gap. They are called the Golden Rhombohedra. Their faces are the same as the 2D rhombi of Penrose set #2.

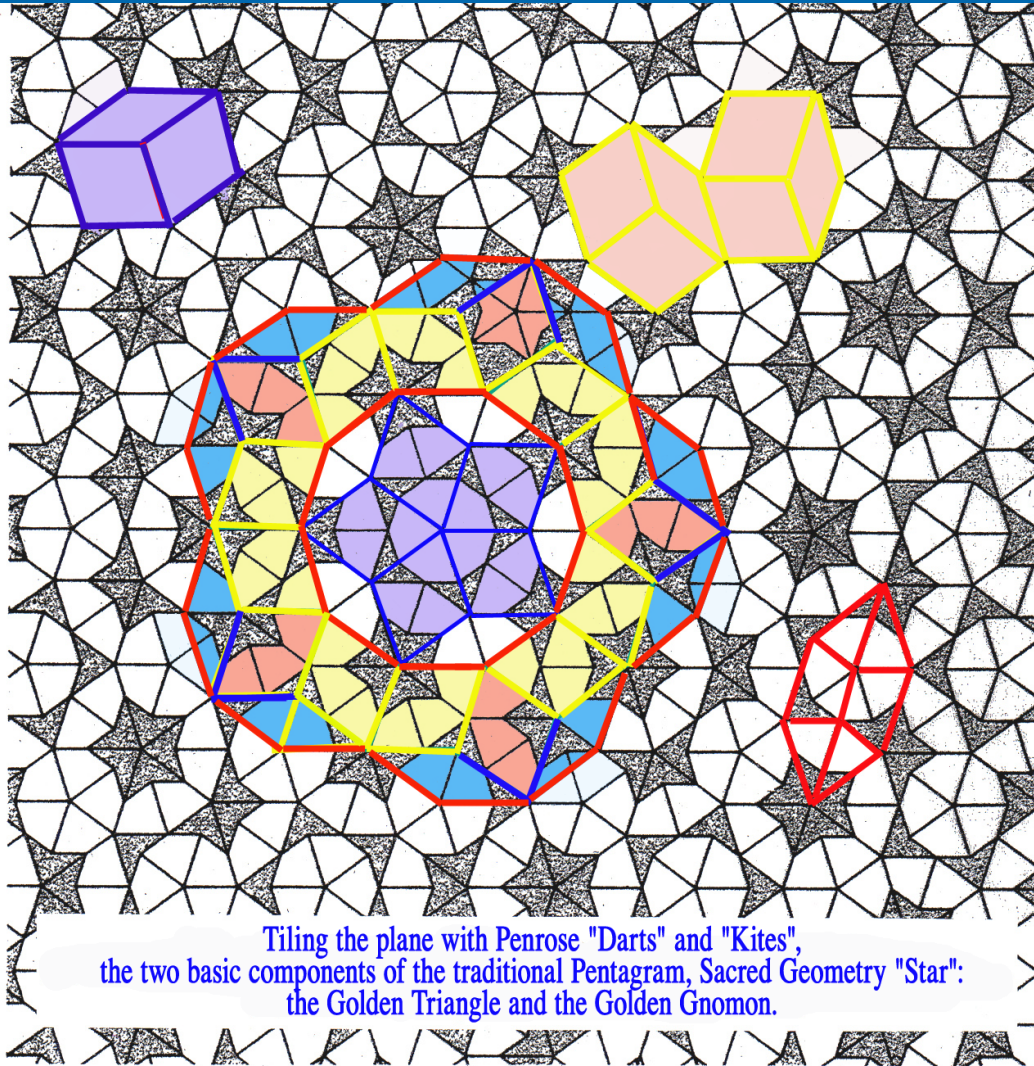


The two golden  
rhombohedra

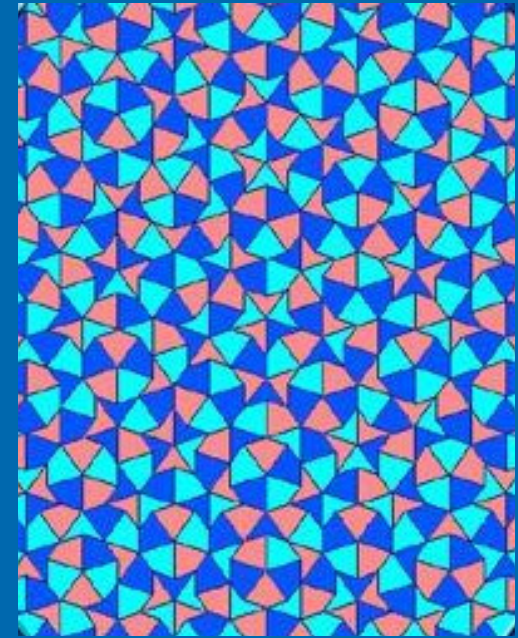


← Two forms of  
rhombic golden polyhedra  
based on the Penta-Modules.

### SG106.4.2.3 Penrose Tiling (3)



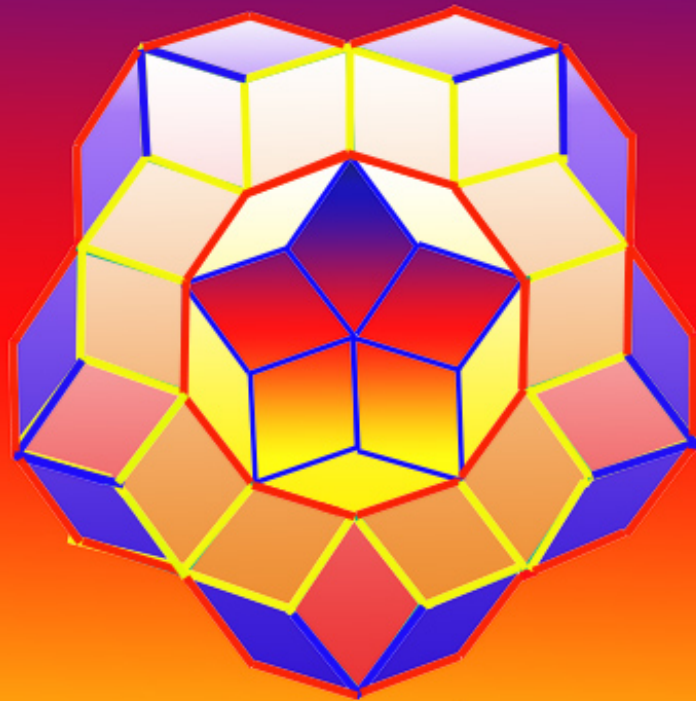
Tiling the plane with Penrose "Darts" and "Kites",  
the two basic components of the traditional Pentagram, Sacred Geometry "Star":  
the Golden Triangle and the Golden Gnomon.



← Penrose Tiling  
with Darts &  
Kites.

[Notice the overlaid  
3D macro-patterns  
matching the golden  
geometry  
proportions.]

## SG106.4.2.4 Penrose Tiling (4)



← A colored version of the 3D macro-pattern emerging from “Penrose Tiling”.

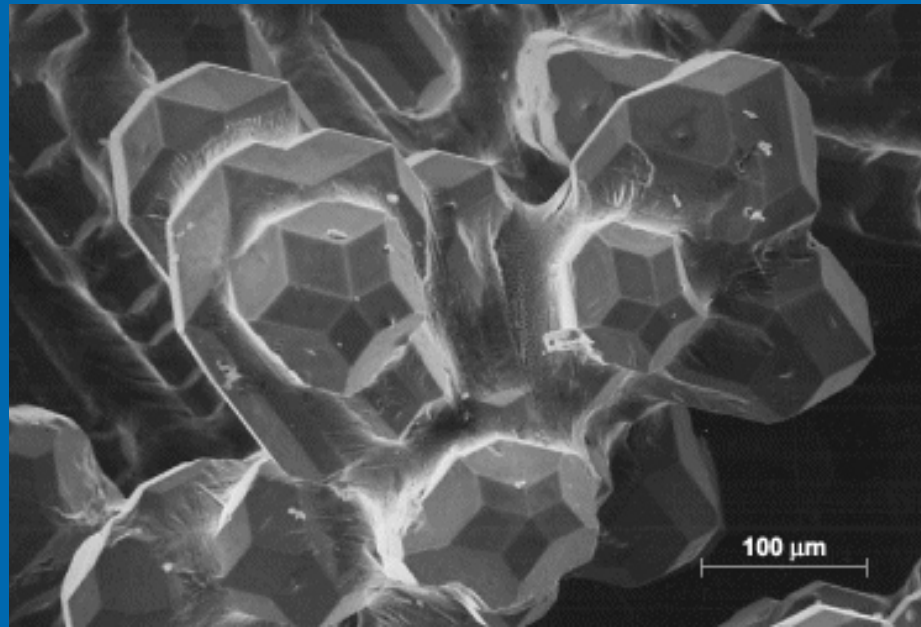
These pentagonal geometries are found in quasicrystals.

## SG106.4.3.1 Quasicrystals - The Story (1)

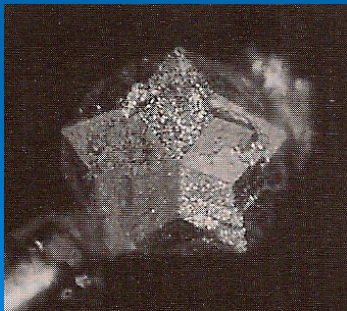
November 12th, 1984: the Physical Review Newsletter published a ground-breaking paper by Dan Schachtman and others. The paper announced the discovery of a “*quasicrystal*” with a 5-fold symmetry.

This was an ‘*impossible*’ crystal. According to the standards of crystallography, there were only two types of crystals: either amorphous (like glass) or highly ordered & symmetric (like table salt). Furthermore, periodic crystals only exhibit symmetries of 2, 3, 4 and 6: a 5-fold (icosahedral) symmetry was not “*allowed*”.

The International Union of Crystallography has since been obliged to redefine the term “crystal” as the newly discovered quasicrystals indeed existed, although “forbidden”, and proved to share Sacred Geometry PHI properties with the Penrose Tiles.



Alloy of aluminum, copper and iron showing icosahedral symmetry.



Quasicrystal  
Al-Li-Cu

Quasicrystals are somewhere in between amorphous & periodic structures: they exhibit fold symmetry and long-range order (periodicity) but lack absolute translational symmetry (a shifted copy will never exactly match with its original). Thus Quasicrystals display order within disorder: they bridge order & chaos.

(Remember the Goddess Harmony in the Greek Mythology? [◆SG102])

SG106.4.3.2

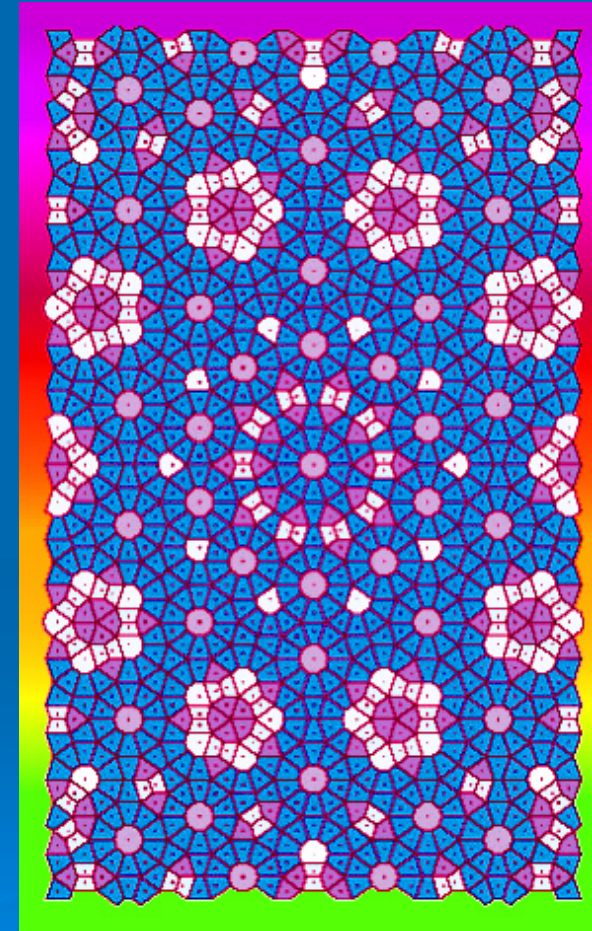
## Quasicrystals - The Story (2)

Since the original discovery of Shechtman hundreds of quasicrystals have been reported and confirmed. Undoubtedly, the quasicrystals are no longer a unique form of solid: they exist universally in many metallic alloys and some polymers. Quasicrystals are found most often in aluminum alloys (Al-Li-Cu, Al-Mn-Si, Al-Ni-Co, Al-Pd-Mn, Al-Cu-Fe, Al-Cu-V, etc.), but numerous other compositions are also known (Cd-Yb, Ti-Zr-Ni, Zn-Mg-Ho, Zn-Mg-Sc, In-Ag-Yb, Pd-U-Si)

Except for the Al-Li-Cu system, all the stable quasicrystals are almost free of defects and disorder, as evidenced by x-ray and electron diffraction revealing peak widths as sharp as those of perfect crystals such as Si (silicon) used for computer chips. Diffraction patterns exhibit 5-fold, 3-fold and 2-fold symmetries, and reflections are arranged quasi-periodically in three dimensions.

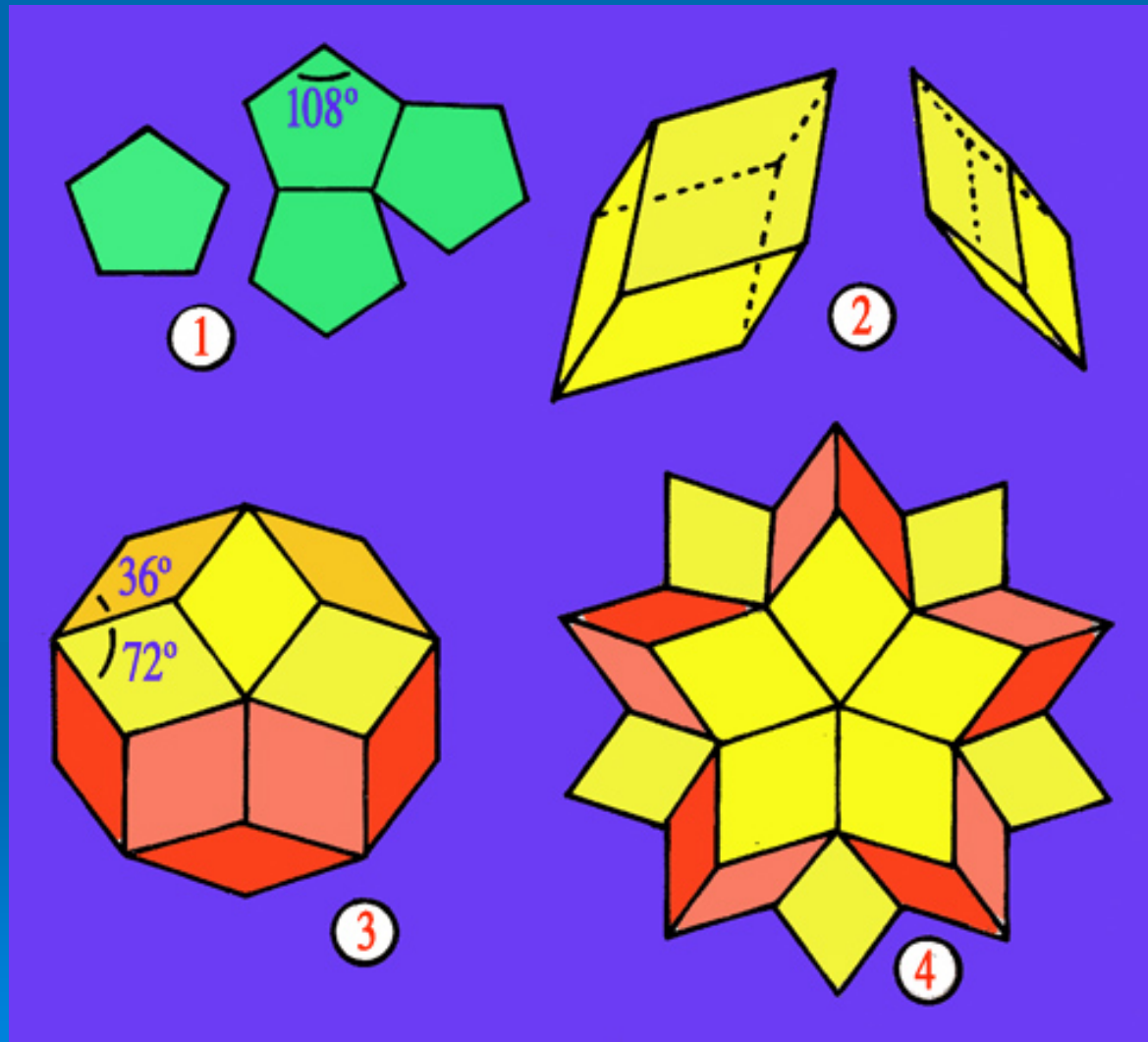
The origin of the stabilization mechanism is different for the stable and meta-stable quasicrystals. Nevertheless, there is a common feature observed in most quasicrystal-forming liquid alloys or their undercooled liquids: a local icosahedral order. The icosahedral order is in equilibrium in the liquid state for the stable quasicrystals, whereas the icosahedral order prevails in the undercooled liquid state for the meta-stable quasicrystals. (*Wikipedia: Quasi-crystals*)

Thus, not only the long-standing topic of “recreational mathematics”, i.e. “tiling with 5-fold symmetry” has found nature-made and man-made counterparts, but models of quasi-periodic tiling have now entered highly theoretical fields (particle physics, mathematical topology and astro-cosmology) as well as very practical fields of material sciences & applied technology.





## SG106.4.3.3 Quasicrystals - The Story (3)



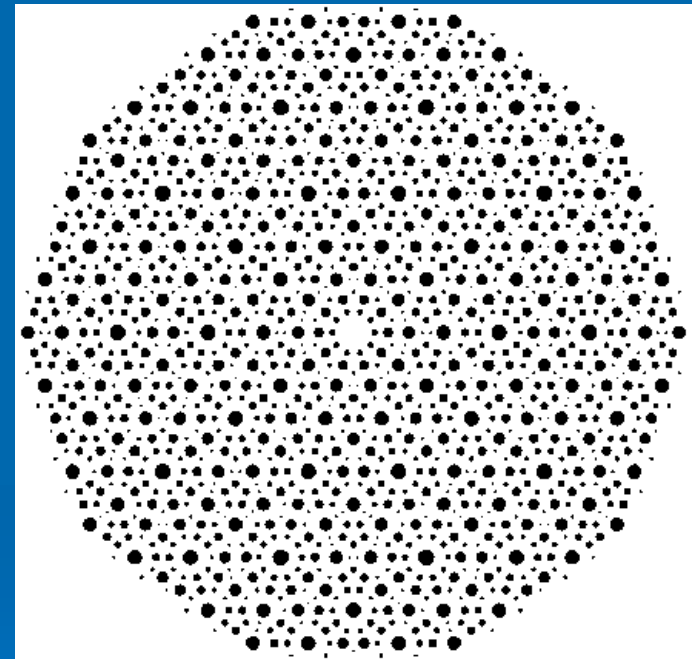
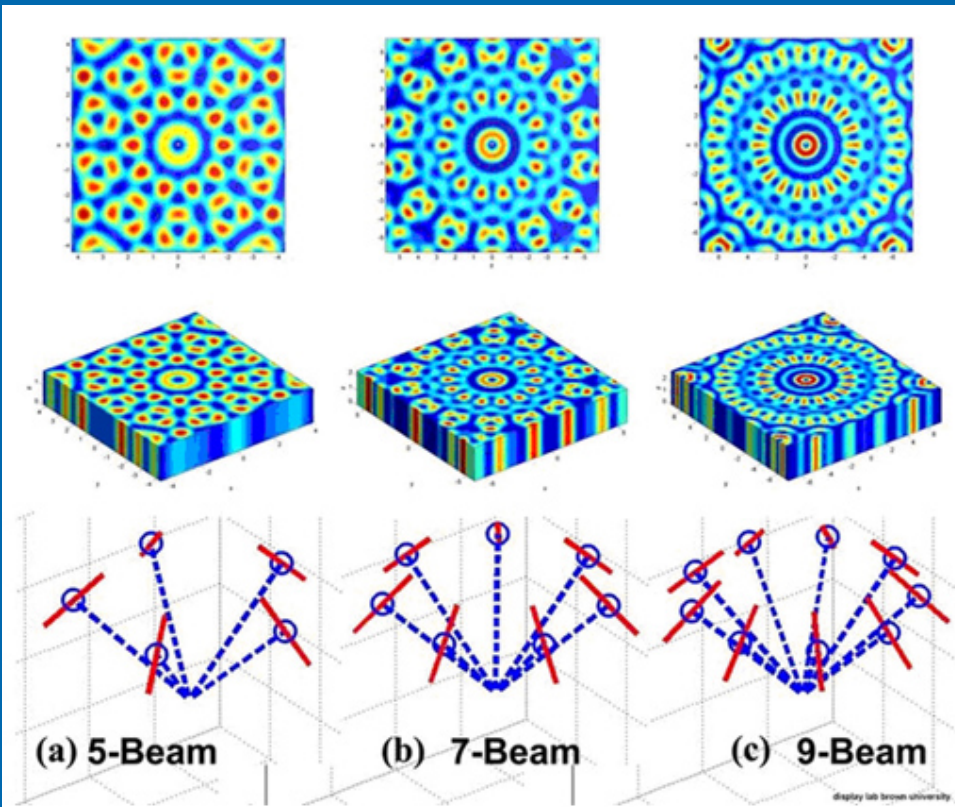
1. Tiling the plane is impossible with regular crystals. The mathematical reason is simple: the summit angle of the pentagon is not a sub-multiple of  $2\pi$ .

2. The two basic rhombohedra allow tiling in 3D.

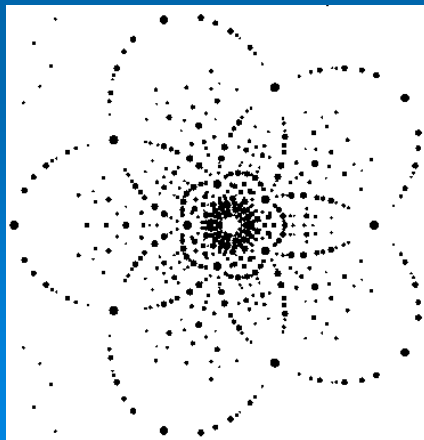
3. Combined, they form the "yang" or *convex tricontahedron* (30 faces).

4. A "yin" or *concave polyhedron* (60 faces) fits between the triacontahedra. This arrangement forms a quasicrystal.

SG106.4.4  
Quasicrystals -  
Diffusion Patterns



Laue Diffusion  
Pattern →

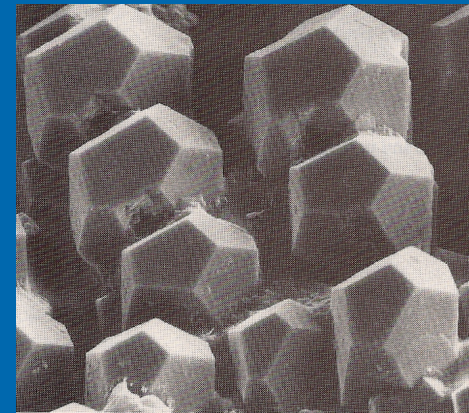


## SG106.4.5.1 Quasicrystals - R and D (1)

- Quasicrystals have been called “*a new state of matter*”, as they share some properties of regular crystals as well as properties of non-crystalline matter.

- The pentagonal symmetries of quasicrystals have opened up a vast range of new research and understanding about ordered non-periodicity.

Crystallography got projected into quantum physics and the geometry of solids has now welcome (back) the penta-symmetrical rotation of the atomic patterns forming these quasi-crystalline alloys. Let us remember that penta-symmetry is based on the Golden Ratio and the key to Harmonic Vortex energy transmission, as enacted in the DNA.



Quasicrystal  
Al-Cu-Ru

- Technologists have taken advantage of the special properties of quasicrystals for industrial applications. For instance, the hardness of quasicrystals comes from their metallic bonding: unlike metals with translational periodicity, quasicrystals will not shear along plane boundaries. Razor blades and surgical instruments are now produced with quasi-crystals alloys. Quasicrystals have also been associated with hydrogen storage: a storage capability of up to two atoms of hydrogen per quasicrystal atom has been found.

- Roger Penrose and other researchers see in quasicrystals a way to link the classical physics of the human scale to the quantum physics of the atomic scale. John W. Cahn explains that quasicrystals imply a higher-dimensional hyperspace, as they seem to act as a bridge by partaking of two spaces simultaneously.

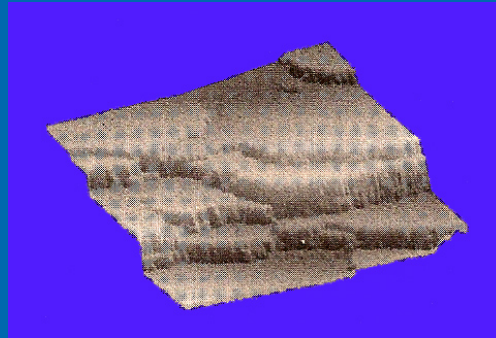
Indeed, whereas natural crystals are formed atom by atom without reference to the remote position of other atoms, in the case of quasicrystals the non-periodicity of their pentagonal tiling presupposes that the atoms need to know the position of remote “atomic tiles” to know the type and 3D position of new tiles...

So we have here the non-local effects encountered in quantum physics. Johannes Kepler who was playing with 5-fold tiling patterns as well cosmological harmony would be (is?) quite pleased!

An Earth Community question:  
what does that say about the oneness of humanity’s global consciousness?

## SG106.4.5.2 Quasicrystals - R and D (2)

Another aspect of the intimate link between quasicrystals and the Golden Ratio PHI was uncovered recently and described by Mario Livio, in his information-filled book:



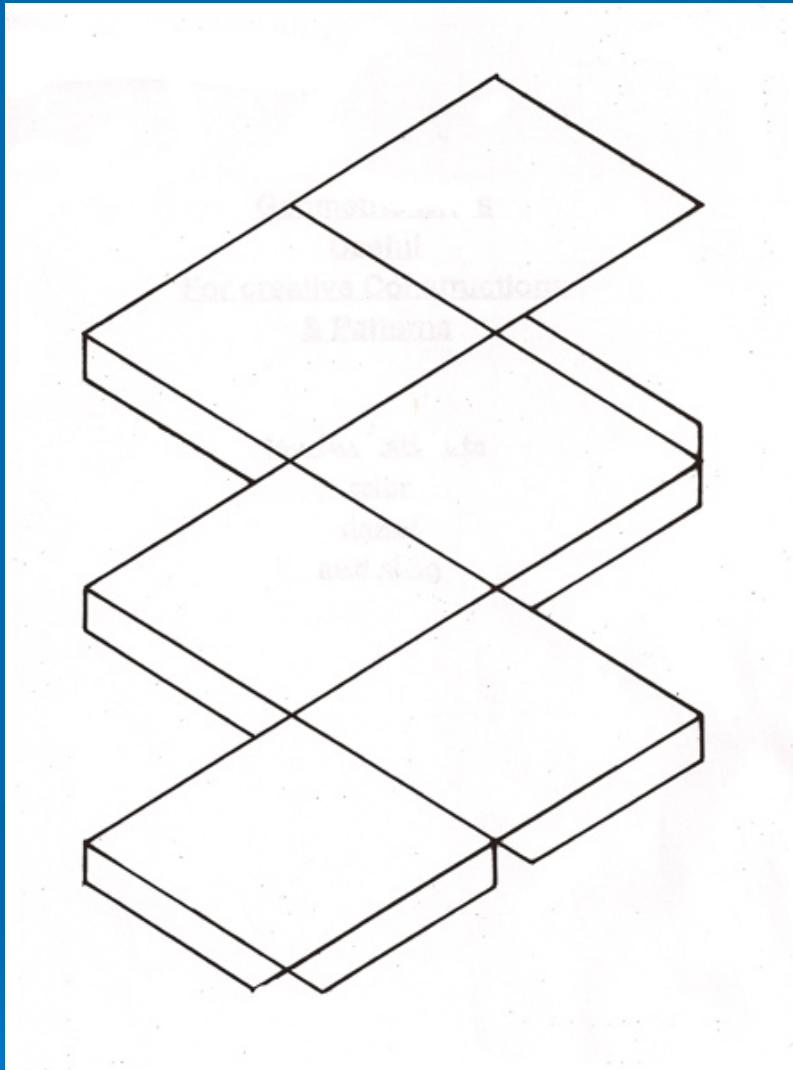
*“Using scanning tunneling microscopy (STM), scientists... were able to obtain hi-res images of the surfaces of an aluminum-copper-iron alloy and an aluminum-palladium-manganese alloy, both of which are quasicrystals.*

*The images show flat “terraces” terminating in steps that come primarily in two heights, “high” and “low” (both measuring only a few hundred-millionths of an inch).*

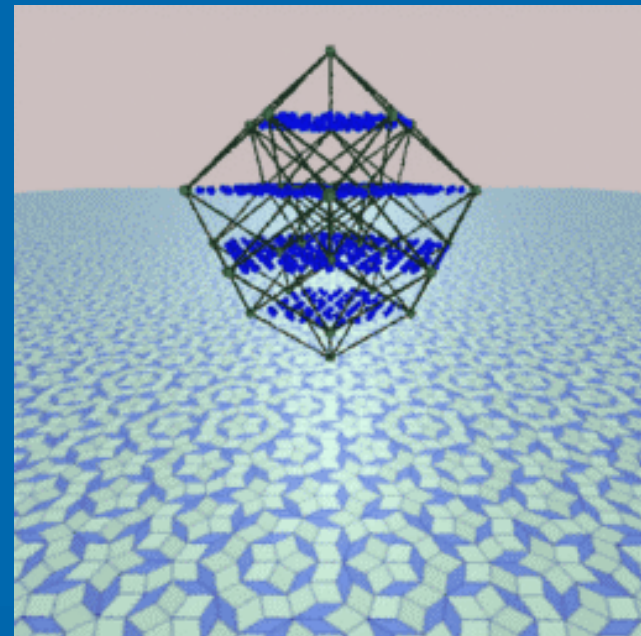
***The ratio of the two heights was found to be equal to the Golden Ratio!”***

*(Mario Livio. The Golden Ratio. 2002.)*

## SG106.4.6 Quasicrystals - Do it Yourself



↑ “Net” (fold-out pattern) for the small Golden Rhombohedron (large / small axis =  $\Phi$ ).  
The 6 faces are identical to the 3D “*fat rhombus*” Penrose tile.

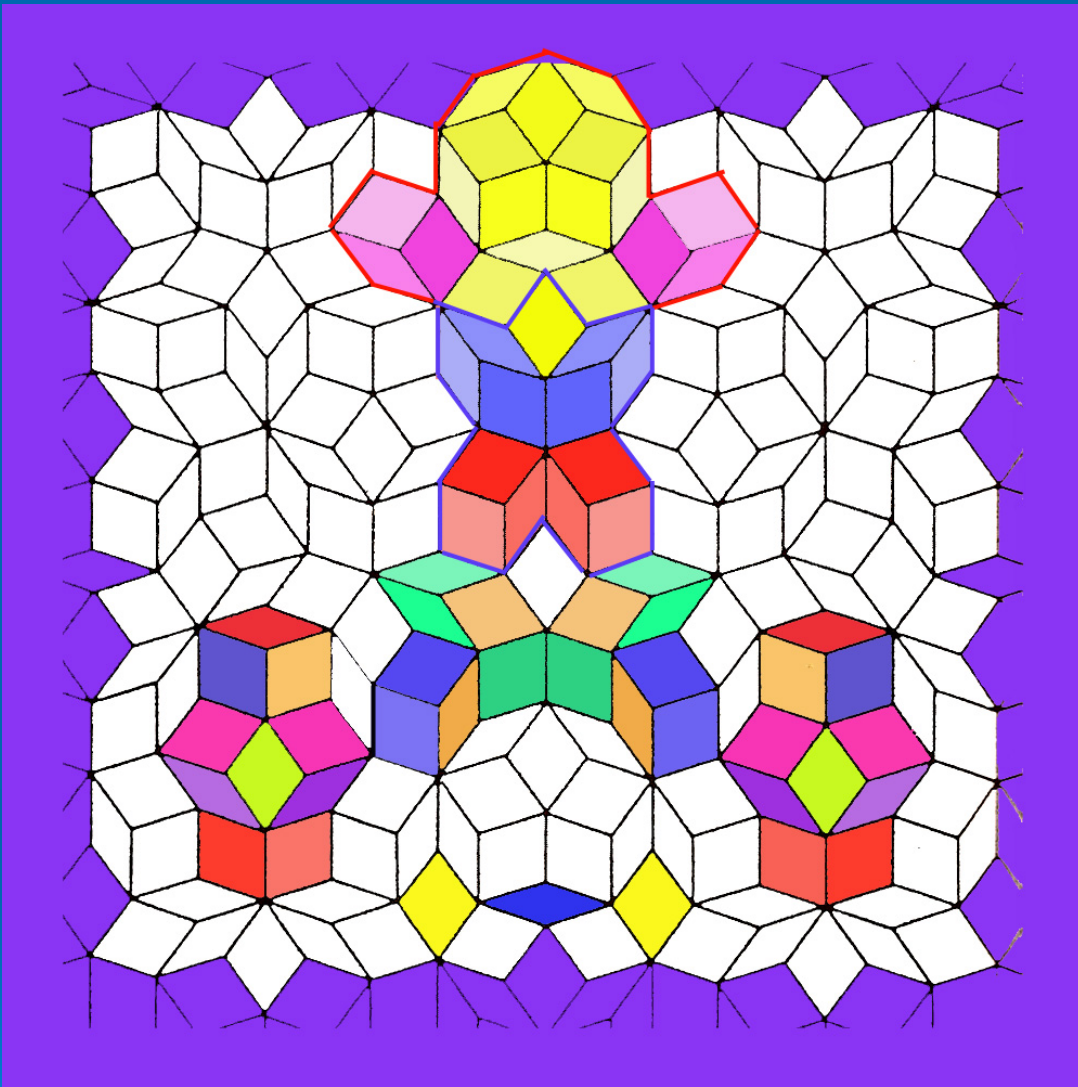


↑ QuasiTiler logo.

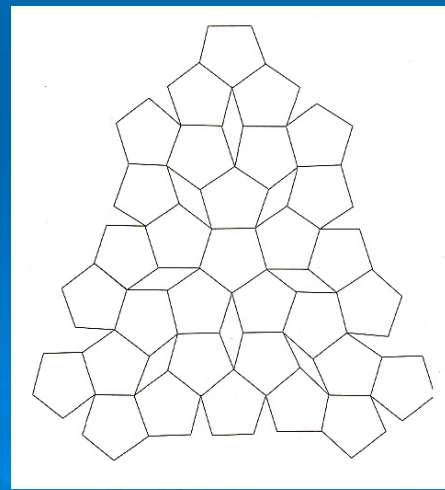
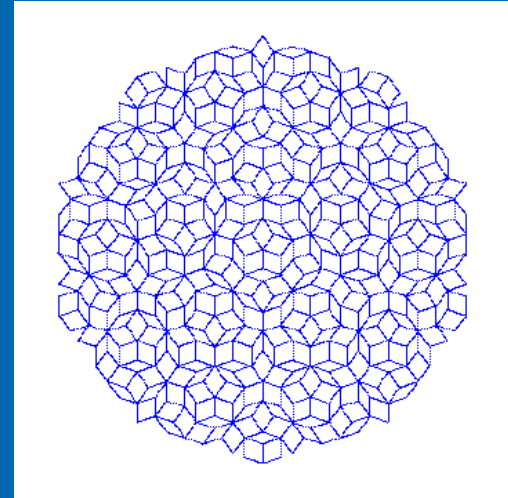
*QuasiTiler* is a software program allowing you to design your own quasicrystal bathroom tiles and more...

[www.geom.uiuc.edu/apps/quasitiler/about.html](http://www.geom.uiuc.edu/apps/quasitiler/about.html)

SG106.4.7.1  
**Quasicrystals -  
Design (1)**

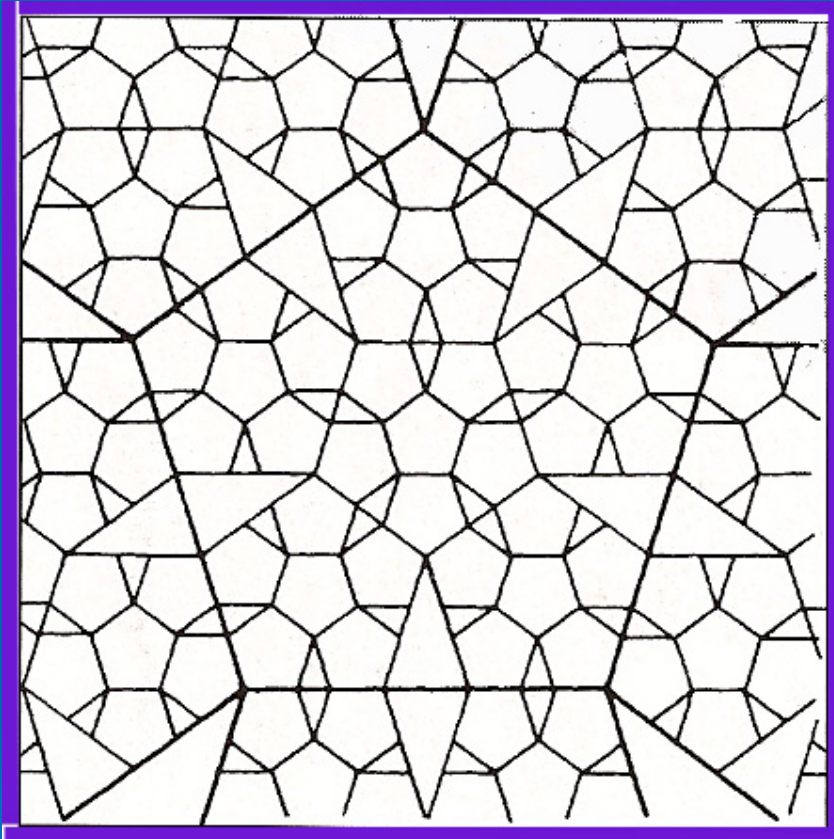


**Nano Gnome playing  
in the Quasicrystal Field**



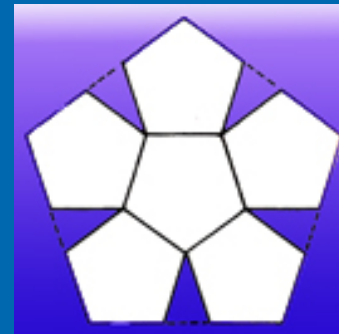
**Albrecht Dürer's  
Design, 1500's**

## SG106.4.7.2 Quasicrystals - Design (2)



From:  
Istvan Hargittai.  
*Symmetry, A Unifying Concept.* 1994.

Step #1: Take 7 regular pentagons and combine 6 of these to make a larger pentagon:



Step #2: Take the 7th pentagon and divide it thusly:



Step #3: Take the 5 triangles from the 7th pentagon and use them to fill the gaps in the large pentagon.

Step #4: Take 6 more large pentagons and continue the same procedure.

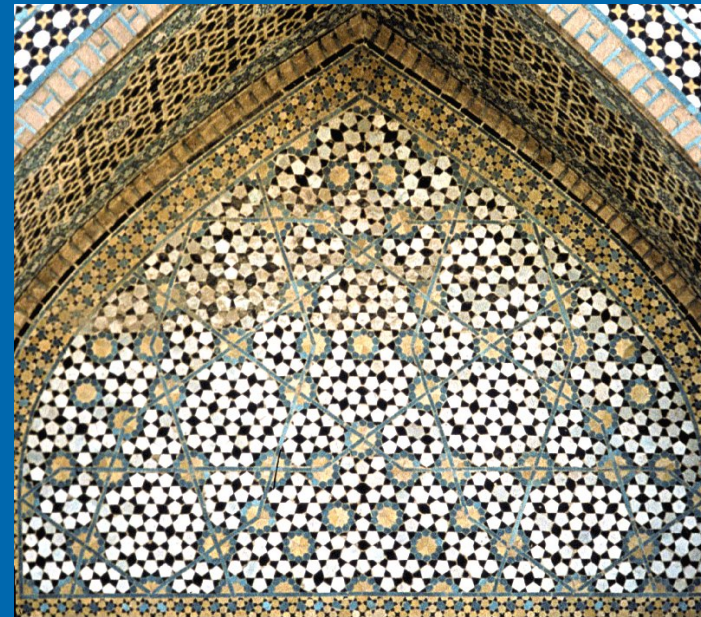
## SG106.4.8 Quasicrystals - Islamic Patterns

In a 2007 Science article, Peter Lu and Paul Steinhardt have investigated the presence and knowledge of quasicrystal patterns in medieval Islamic art and architecture.

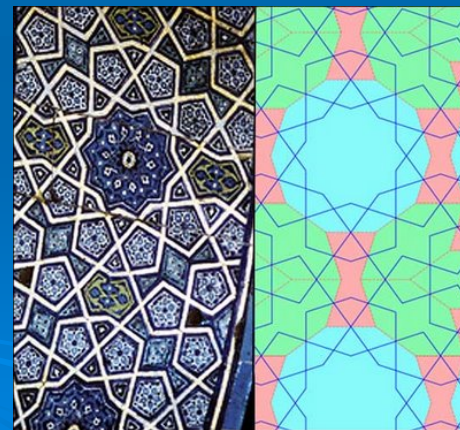
Peter Lu at Harvard University became intrigued by the patterns of tiling, called *girih*, on a mosque while visiting Uzbekistan. By analyzing a few thousand photographs of tiling on various buildings from Turkey to Afghanistan, Lu and Peter Steinhardt of Princeton University found that the patterns of tiles displayed telltale signs of quasicrystals, such as pentagons and 10-pointed stars. They also found that one shrine in Iran had a true quasicrystal pattern on it.

The physicists examined scrolls on which medieval Islamic artists sketched their designs and found that they were using a tiling pattern similar to Penrose's to create the complex patterns.

(Science, 23 February 2007:  
Vol. 315. no. 5815, pp. 1106 - 1110)



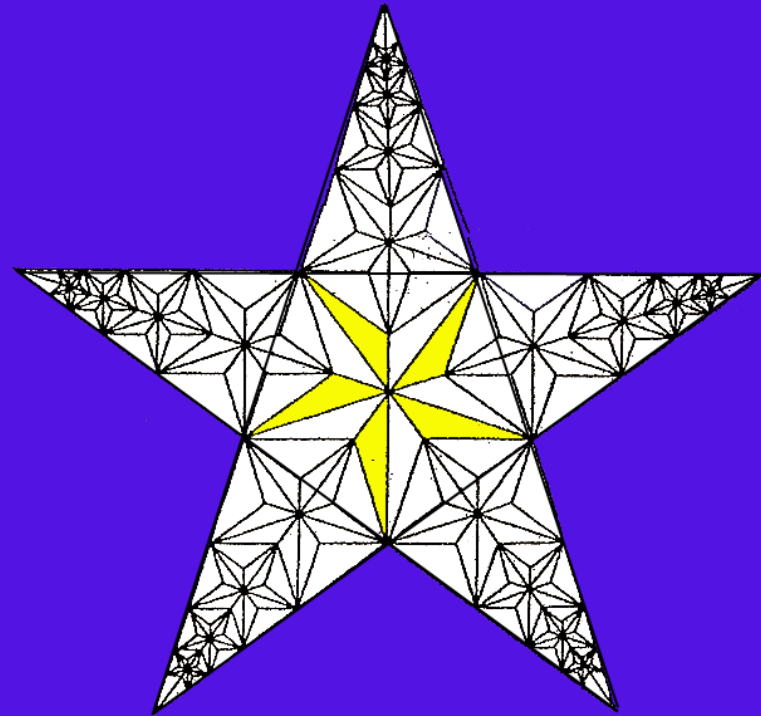
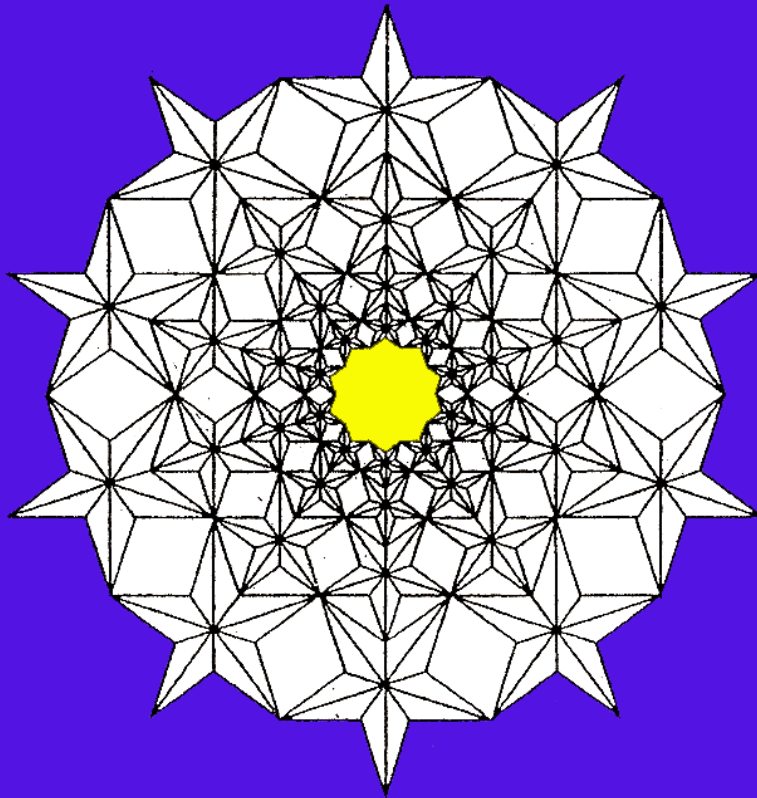
*Darb-I Imam Shrine, Isfahan, Iran.*



← Islamic medieval pattern with quasicrystal design overlay.

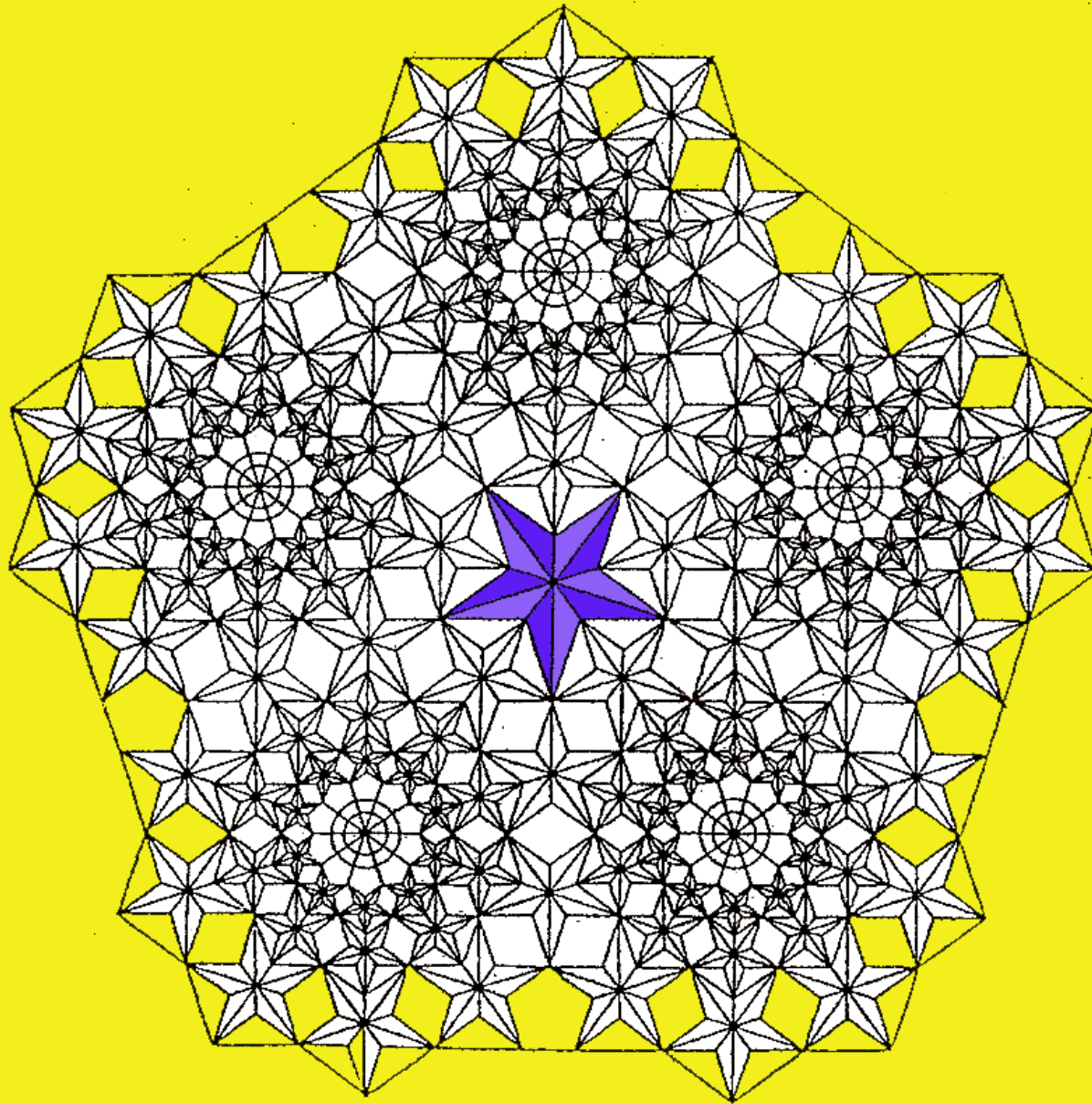


## SG106.4.9.1 Penta Star Fields (1)



(Figures by R. S. Beard)

SG106.4.9.2  
Penta Star  
Fields (2)



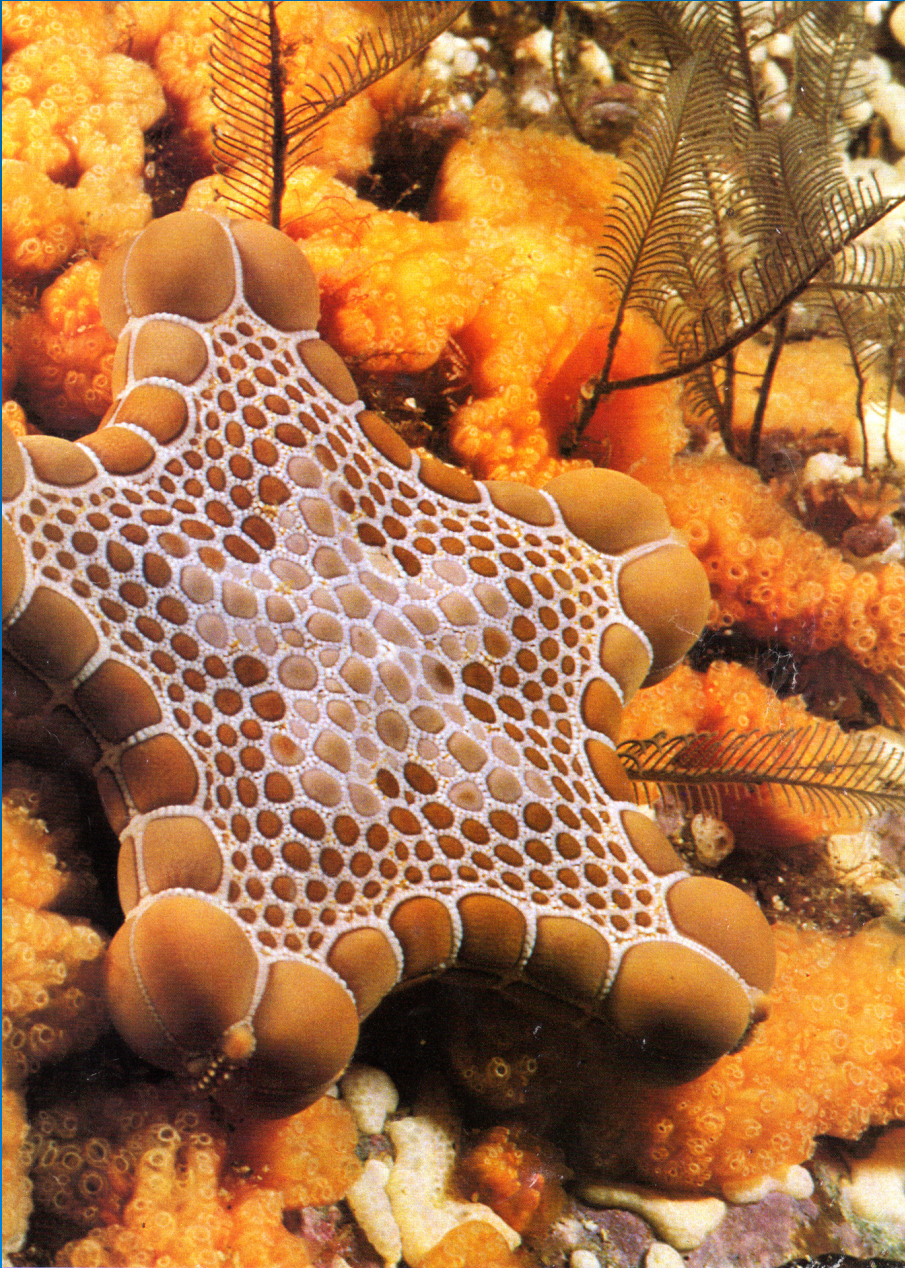
(Figure by R. S. Beard)

## SG106.5 Chapter 5. Penta Gallery



↑ Painting by a 5-years old girl. Belgium 2002.

SG106.5.1.1 Nature -  
Starfish (1)



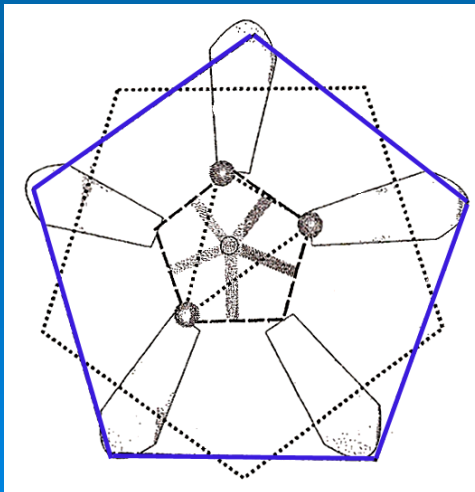


SG106.5.1.2 Nature - Starfish (2)



**SG106.5.1.3 Nature -  
Flowers**

## SG106.5.1.4 Nature - Passion Flower

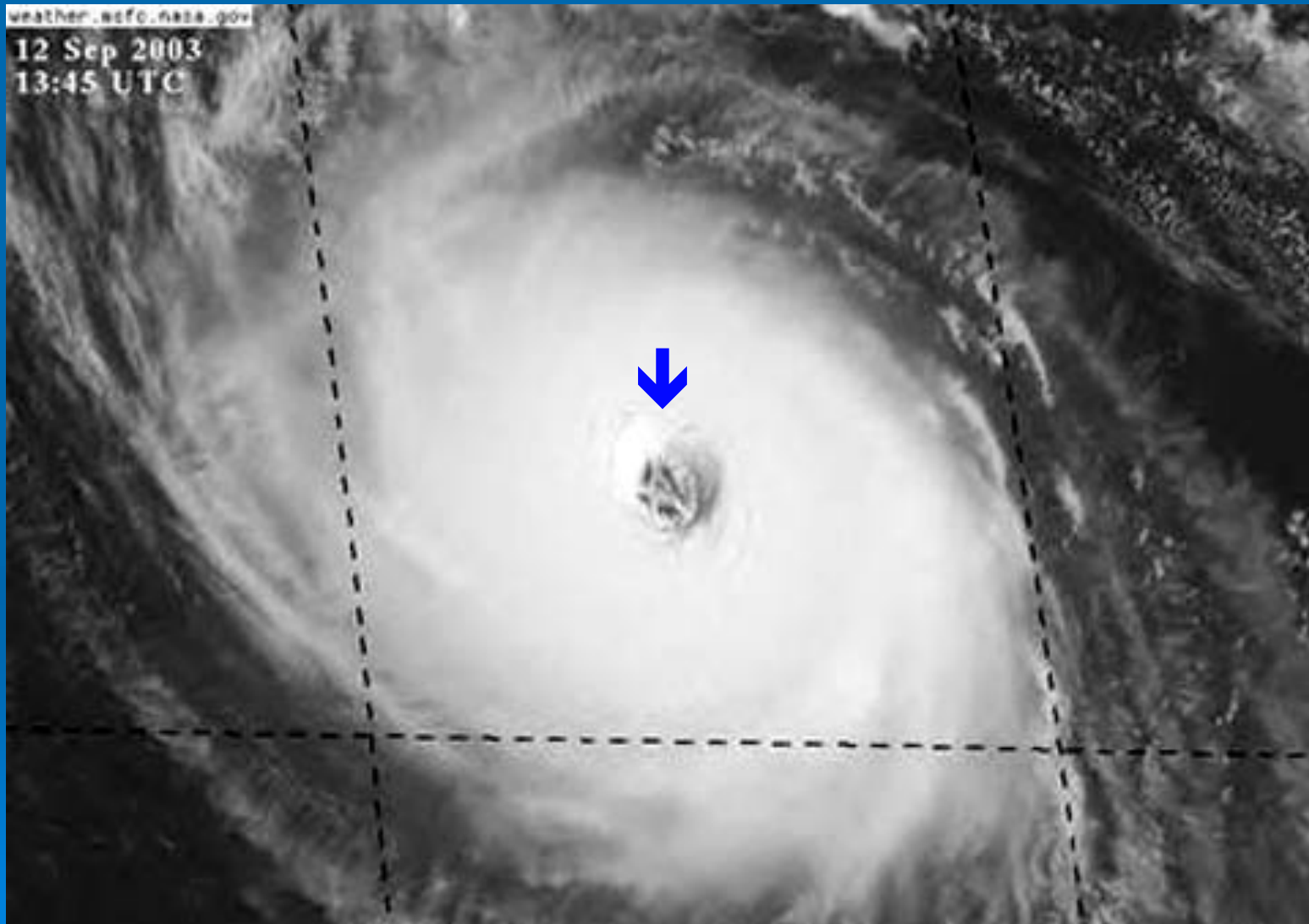


3-arms pistil  
5-branches stamen  
10-petaled corolla

### The magnificent Passion Flower (*Passiflora Incarnata*)

For more on the Passion Flower  
and the phyllotaxis (geometric arrangement)  
of plants: [◆SG205.1](#)

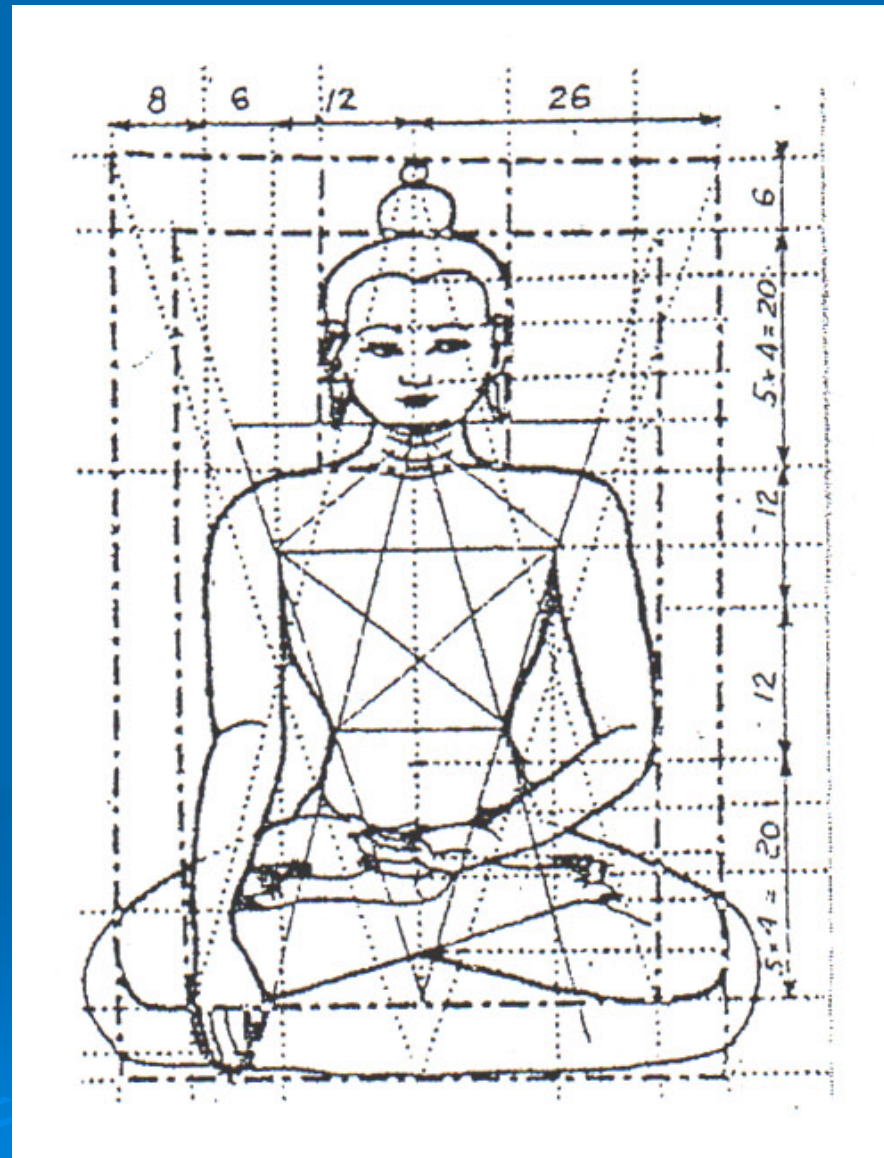
## SG106.5.1.5 Nature - Hurricanes



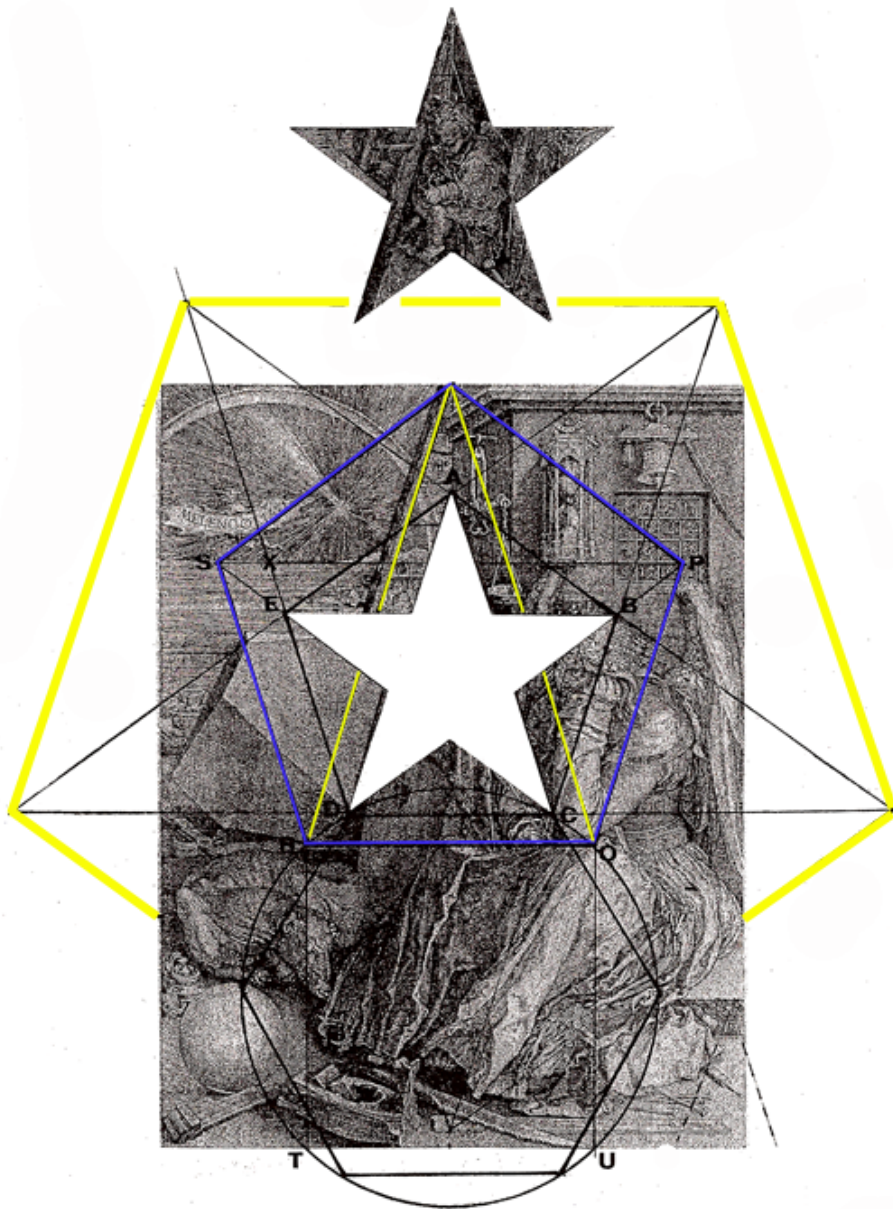




SG106.5.2.2 Culture -  
Buddhist Art



## SG106.5.2.3 Culture - Art - Dürer's Melancholia



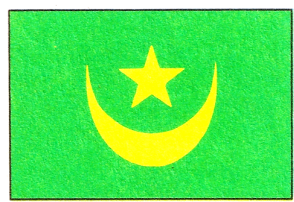
The clue to the overall pentagonal symmetry of Dürer's *Melancholia* engraving (1514) is given at the very top: at the mid-point (where the house meets the sky), the ladder (the traditional symbol of the *Scala Dei* or *Celestial Staircase* or *Jacob's Ladder*) leans on an exact angle of  $18^\circ$ .

$18^\circ$  = half the top angle of  $36^\circ$  in the Golden Triangle of the Pentagram.

This is in accordance with Dürer's habit, apparent in many of his designs, of emphasizing a top-centrally placed angle to point to the underlying geometry.

(More on this extraordinary design in [◆SG302](#)).

## SG106.5.2.4 Culture - 5-Pointed Star in Flags



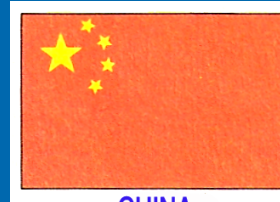
MAURITANIA



TURKEY



NEW ZEALAND



CHINA



EUROPE



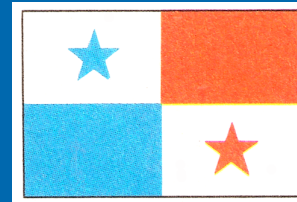
MOROCCO



SURINAM



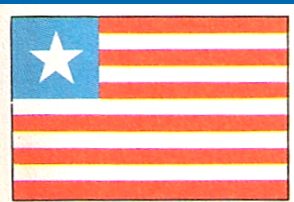
HONDURAS



PANAMA



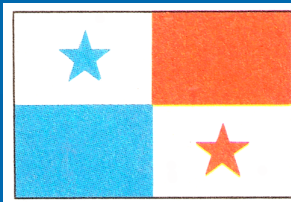
NORTH KOREA



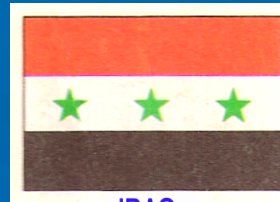
LIBERIA



CAMEROUN



PANAMA



IRAQ



DJIBOUTY



SOMALIA



YUGOSLAVIA



VENEZUELA



CUBA

And more  
star nations...  
(35 so far)



## SG106.5.2.5 Culture - The US Star-spangled Flag



On June 14, 1777, the Marine Committee of the Second Continental Congress passed the Flag Resolution which stated: *"Resolved, That the flag of the United States be thirteen stripes, alternate red and white; that the union be thirteen stars, white in a blue field, representing a new Constellation"*. (Note the geometric layout).

The US flag has been changed 48 times as new states were added to the Union. The current 50 stars on the flag represent the 50 U.S. states and the 13 stripes represent the original 13 colonies that rebelled against the British Crown and became the first states in the Union.

Nicknames for the flag include the *Stars and Stripes* and *The Star-Spangled Banner*.

The origin of the star symbol is unclear. However, *"traditions abound; for example, that the stripes refer to rays of sunlight and that the stars refer to the heavens, the highest place that a person could aim to reach"* (Wikipedia).



↑ Coat of arms of George Washington

The United States Army Institute of Heraldry has plans for flags with up to 56 stars, using a similar staggered star arrangement "should additional states accede".



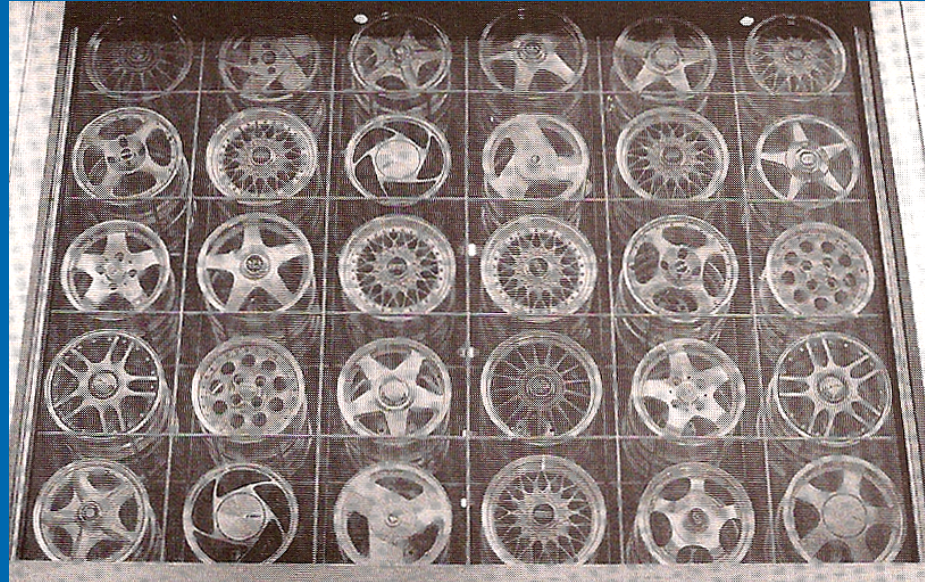
← The 1777 Flag of the United States, thought to be the first flag to include the five-pointed star.

In use June 14th, 1777 - 1 May, 1st 1795.  
(Note the various geometric layouts: triangles, hexagon, rhombus, rectangle).



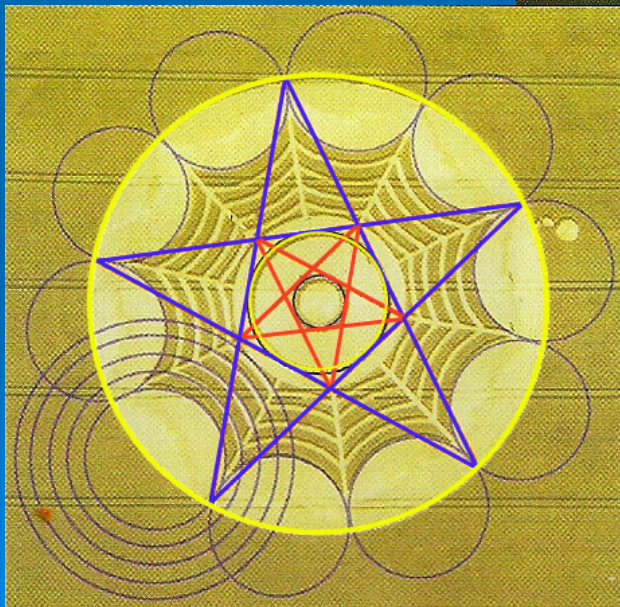
↑ A proposal for the 51 stars flag

## SG106.5.2.6 Culture - Car Wheels



Hubcaps are oftentimes based on penta-symmetry, for best stability and strength.

## SG106.5.3.1 Penta Crop Circles (1)



Penta-deca geometries  
in the Avebury Crop Circle, 1994.

## SG106.5.3.2 Penta Crop Circles (2)



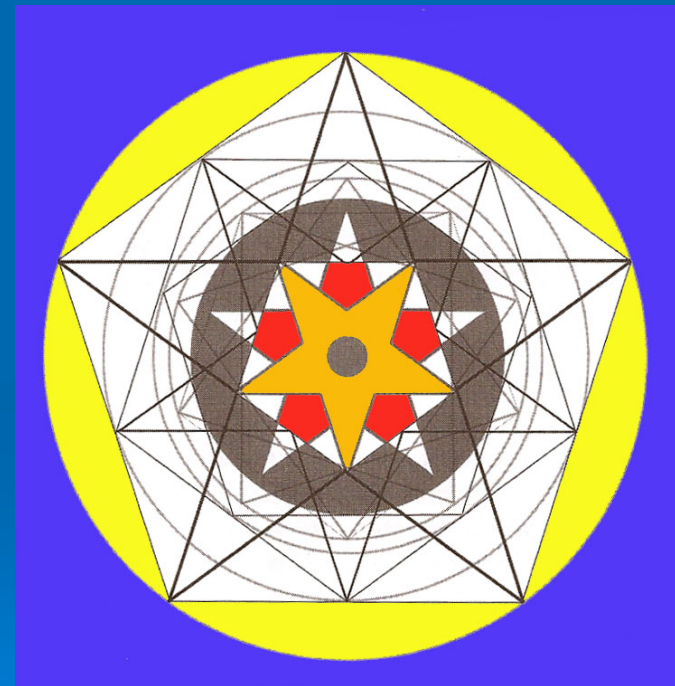
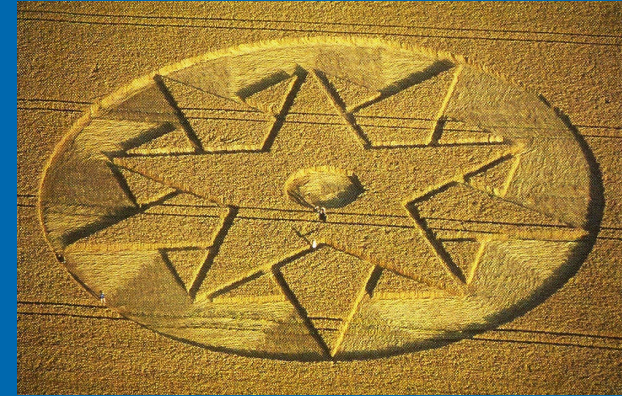
Bishops Cannings.  
1997.  
55 meters.



### SG106.5.3.3 Penta Crop Circles (3)

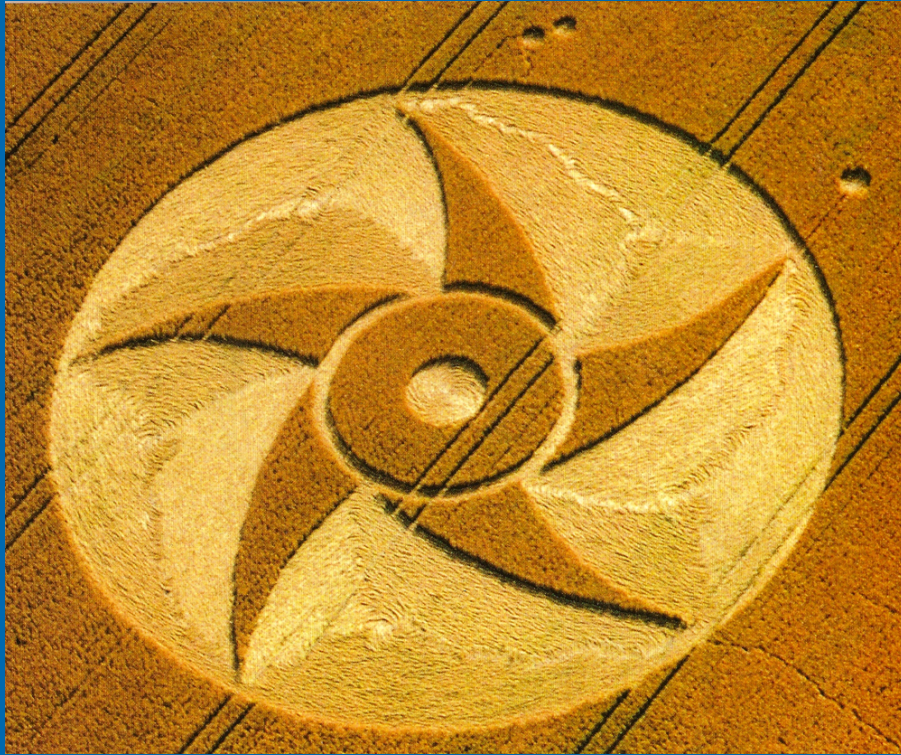


Beckhampton, 1998. 64 meters.



Beckhampton.  
Geometric overlay by  
Freddy Silva.

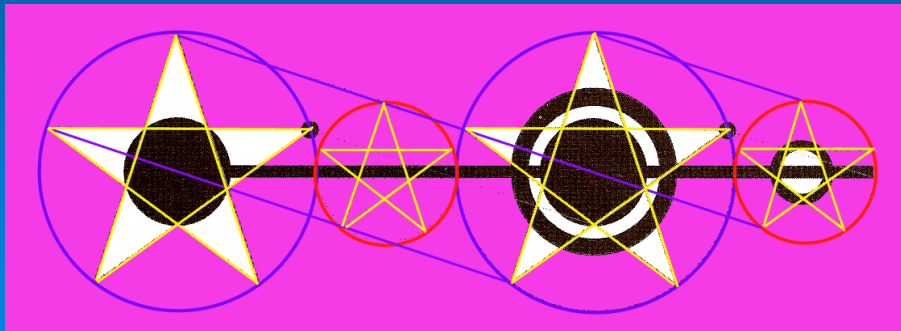
## SG106.5.3.4 Penta Crop Circles (4)



↑ Down Hill. 1995



↑ Avebury Trusloe. 1998. 77 meters



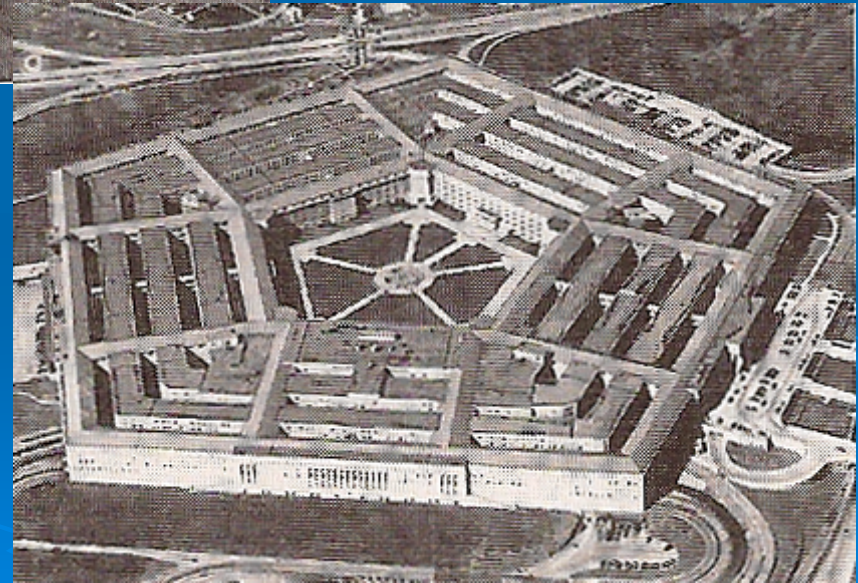
← Penta geometry layout on Alton Priors crop circle. 1991

SG106.5.4.1  
**Architecture (1)**

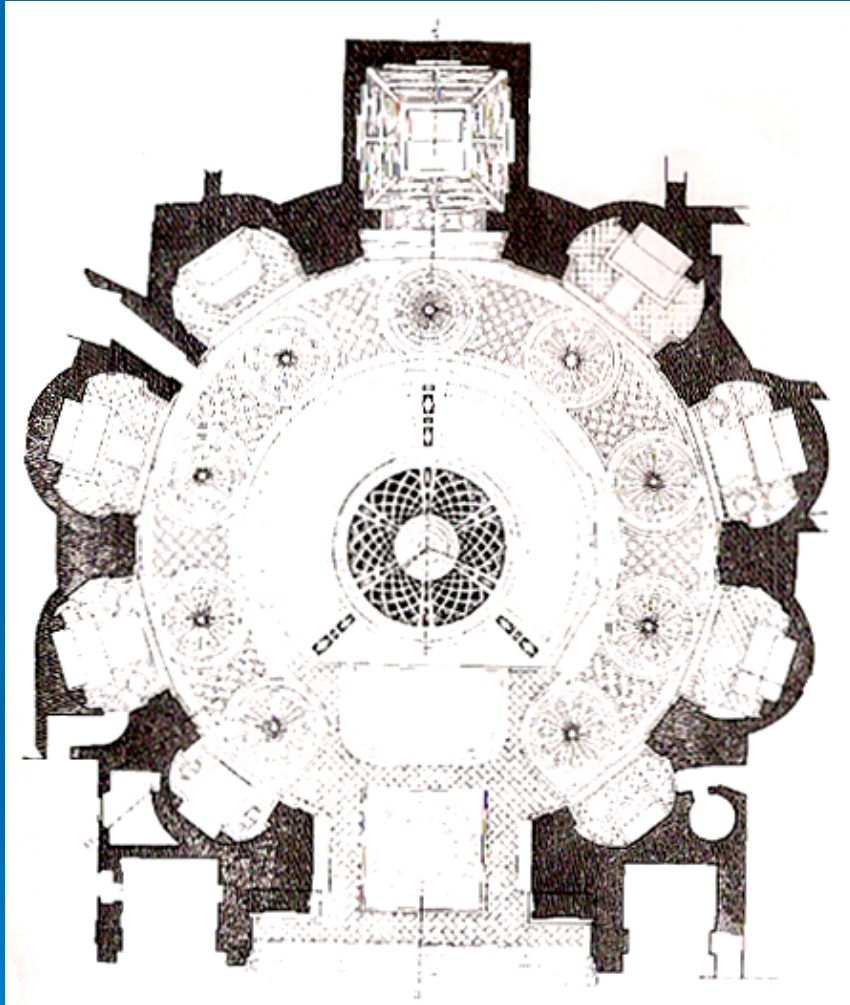


↑ Goryokaku Castle, Japan.

Pentagon →  
Washington D.C.



## SG106.5.4.2 Architecture (2)

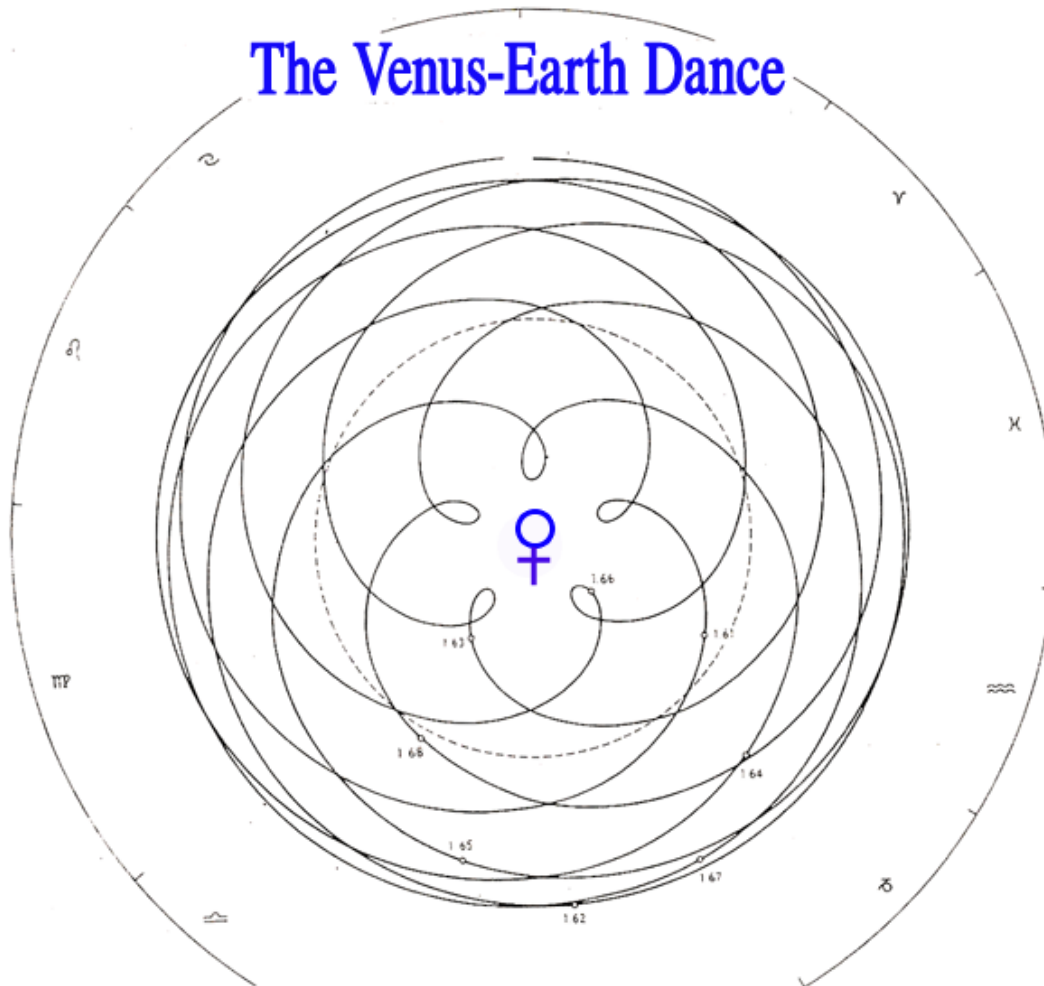


Decagonal plan of Michelozzo's Church  
Of the Annunziata, Florence. Italy.



↑ Medieval city of  
Varad, Hungary

## The Venus-Earth Dance

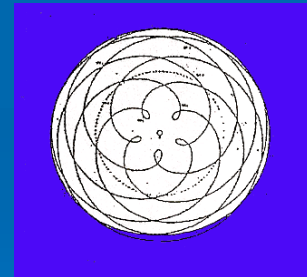


Geocentric Venus orbit 1960-1968

Numbers show the position of Venus at the beginning of each year. The dashed circle is the Sun's orbit. (J. Schultz)

## SG106.5.5 Astro Harmonics

$$\begin{aligned} \text{Earth Year} / \text{Venus Year} \\ = \\ 365.25 \text{ days} / 224.7 \text{ days} \\ = \\ \Phi \end{aligned}$$



## SG106.5.6.1 Traditions - 5 Classical Elements

Many ancient philosophies used a set of 5 archetypal classical elements to explain the essence of the universe and the patterns in nature.

The word “element” refers to a generic substance rather than the chemical element of modern physics.

The dominant theory of classical elements, held by the Greek, Medieval, Hindu, Buddhist and Japanese systems of thought, is that there are five elements, namely EARTH, WATER, AIR, FIRE, and a fifth element known variously as Idea, Void, “*Quintessence*” or AETHER (the term “quintessence” derives from the Latin word “*quint*” =“fifth”). The 5 elements are associated with the 5 platonic solids and the buddhist *Stupa*.

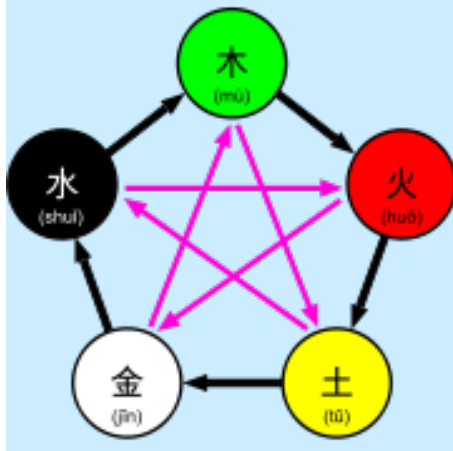


Greek	AIR	EARTH	FIRE	WATER	AETHER
Alchemy					
Hindu	Vayu	Prithvi	Agni	Ap	Akasha
Buddhist	Pavan	Bumi	Tejas	Jala	Akash



By contrast the Chinese had a somewhat different series of elements: Fire, Earth, Water, Metal & Wood, which were understood as types of energy in constant interaction and flux with one another, rather than the Western idea of different kinds of fixed substance.

## SG106.5.6.2 Traditions - Chinese 5 Elements (1)



↑ The Cycles of the 5 Elements: the CREATION cycle (black arrows, clockwise pentagon shape) and the DESTRUCTION (overcoming) cycle (purple arrows, pentagram shape).

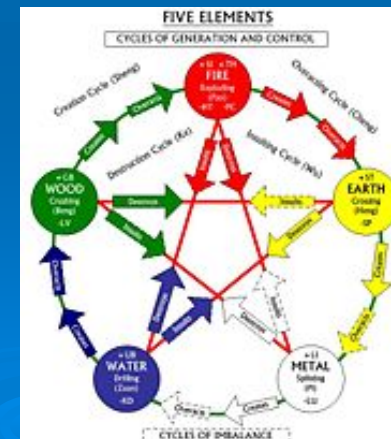
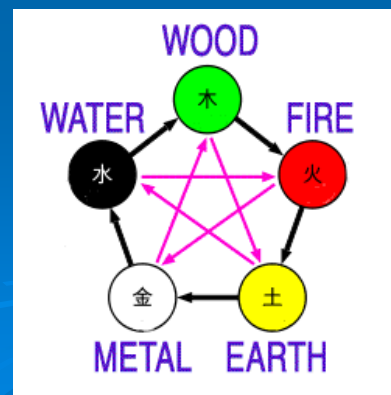
Wood (Chinese pinyin: mù)  
 Fire (Chinese pinyin: huǒ)  
 Earth (Chinese pinyin: tǔ)  
 Metal (Chinese pinyin: jīn)  
 Water (Chinese pinyin: shuǐ)

The traditional Chinese wisdom of the “Five Elements” is based on dynamic cycles of energy following the pentagon and pentagram geometries.

More precisely translated as *Five Movements* or *Five Phases* (*Wu Xing*), the diagram for the Five Elements is an ancient mnemonic device to illustrate energy systems with 5 stages and describe interactions & relationships between phenomena.

“It was employed as a device in many fields of early Chinese thought, such as geomancy (*Feng shui*), astrology, medicine, music, military strategy and martial arts.” (Wikipedia).

The Five Elements system is still a foundation for traditional Chinese Medicine, including acupuncture. The 5 Elements are associated with the 5 organs: liver, heart, spleen, lungs and kidneys.



## SG106.5.6.3 Traditions - Chinese 5 Elements (2)

According to Five Elements (Wu Xing) philosophy, the structure of the cosmos mirrors the five phases. Each phase has a complex series of associations with different aspects of nature.

In the ancient Chinese form of geomancy known as *Feng Shui*, practitioners based their art on the five phases. All of these phases are represented within the *Ba Gua* (8 trigrams). Associated with these phases are colors, seasons, shapes etc... all of which are interacting with each other.

	WOOD	FIRE	EARTH	METAL	WATER
<b>YIN ORGANS</b>	Liver	Heart	Spleen	Lungs	Kidneys
<b>YANG ORGANS</b>	Gall Bladder	Small Intestine	Stomach, Pancreas	Large Intestine	Bladder
<b>OPENINGS</b>	Eyes	Tongue	Mouth, Lips	Nose	Ears
<b>POSITIVE EMOTIONS</b>	Kindness	Love, Joy	Fairness, Openness	Righteousness, Courage	Gentleness
<b>NEGATIVE EMOTIONS</b>	Anger	Hate, Impatience	Worry, Anxiety	Sadness, Depression	Fear, Stress
<b>TRANSFORM PURE ORGAN ENERGY INTO A VIRGIN CHILD DRESSED IN</b>	Green	Red	Yellow	White	Blue
<b>TRANSFORM PURE CHILD ENERGY INTO AN ANIMAL</b>	Green Dragon	Pheasant, Red Bird	Phoenix, Yellow on Red	White Tiger	Blue Deer
<b>EARTH FORCE TAKES THE FORM OF</b>	Green Dragon	Pheasant, Red Bird	Phoenix, Yellow on Red	White Tiger	Black Tortoise
<b>DIRECTIONS</b>	East	South	Center	West	North
<b>PLANETS</b>	Jupiter	Mars	Saturn	Venus	Mercury
<b>UNIVERSAL ENERGY FORCE</b>	Generating	Prospering	Stabilizing	Contracting	Gathering

Based on a particular directional energy flow from one phase to the next, the interaction can be expansive, destructive, or exhaustive. The proper knowledge of energy flow enables the Feng Shui practitioner to apply cures or rearrangement of energy to improve the harmonization of the person's life or the specific location.

The Chinese *Luo Pan* (geomantic compass) incorporates the 8 Trigrams, the 5 Elements and the 4 directions. →



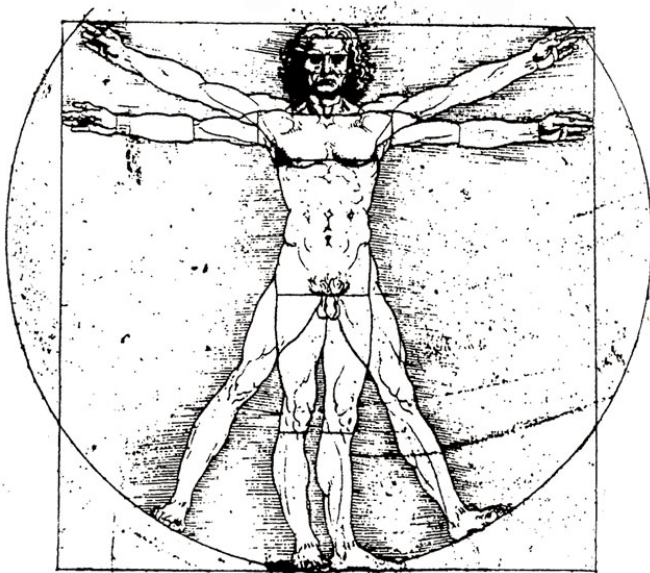
← Table showing some of the many correspondences in the *Feng Shui* Cosmology of the Five Elements.



SG106.5.6.4  
**Traditions -  
The Great  
Human**

← The Chinese character for “*great*” (DA) shows a stylized person with wide open arms & legs.

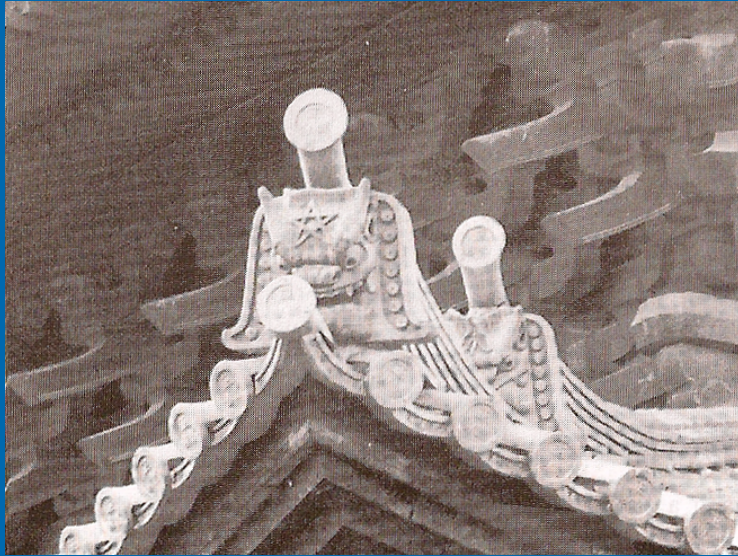
One might say that this is the Chinese version of the Vitruvian / Da Vinci Man.



For more  
on the archetypal number "5"

◆SG202

## SG106.5.7 5-Fold Symmetry in Japan



Pentagram gargoyle, Myoshin-ji temple.  
Kyoto. 17th century.



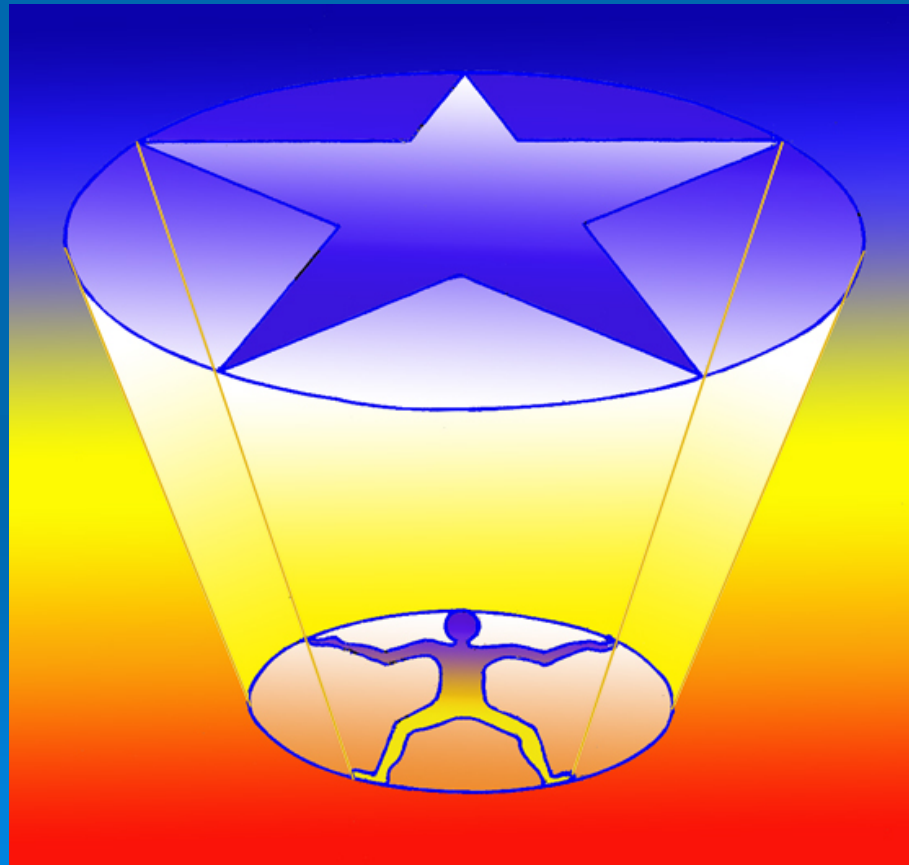
←↑ Pentagrams in Seimei-jinja Shrine.  
Kyoto. Rebuilt 19th century.



## SG106.Ca Conclusion

From the PHI-resonant architecture of the DNA to flowers, quasi-crystals & even hurricanes, the 5-fold symmetry of Golden Growth is sustaining LIFE in its ever-renewed waves of expansion & evolution.

The Pentagram, once the secret emblem of the Pythagorean School, is now flying on many national flags and is used by cutting edge science for, literally, paving a way to the cosmic Quantum Plenum. The Pentagram with its music-like ladder of Phi-multiples is revealing many star-gate secrets.





Whenever in a moment of emotional upheaval,  
**QUICKLY** think of a Pentagram and use it as a healing template:

Visualize it, hold it strongly and project it on a situation needing love & harmony.  
Internalize it as a template of balance centered on your heart.

Standing erect on Mother Earth,  
reaching for Father Sky,  
in the yoga posture of the Da Vinci Human,  
feet apart and well grounded and hands touching the circle of heaven,  
you are the Cosmic Bridge...  
a flower of being

## SG106.Cc Online SG School Curriculum: Intro & Intermediate

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SG 104	Intro IV	PHI: the Golden Ratio & the Fibonacci Series
SG 105	Intro V	The Golden Rectangle & Golden Spiral
SG 106	Intro VI	Pentagons, Pentagrams & the Penta-Modules
SG 107	Intro VII	The Five Platonic & 13 Archimedean Solids
SG 108	Intro VIII	The Vesica Piscis: Cosmic Womb of Creation

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SG 202	Interm II	The Power of Archetypal Numbers
SG 203A	Interm IIIA	Sacred Geometry Resurgence in Science - Part 1
SG 203B	Interm IIIB	Sacred Geometry Resurgence in Science - Part 2
SG 204	Interm IV	PHI in the Human Body, Biology & DNA
SG 205A	Interm VA	The SG of Nature - Part 1: Plants & Phyllotaxis
SG 205B	Interm VB	The SG of Nature - Part 2: Animals & Minerals
SG 207	Interm VII	SG in Architecture, Sacred Sites & Green Design

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SG 302	Adv II	SG in Art, Culture & Creativity
SG 303	Adv III	Universal Symbols: Primordial Knowledge
SG 304	Adv IV	Labyrinths: a Mini-Pilgrimage to Self
SG 305	Adv V	Mandalas & Yantras: Sacred Vortices
SG 306	Adv VI	Languages & Gematrias: Sacred Communication
SG 307	Adv VII	Sacred Geometry in the Healing Arts
SG 308	Adv VIII	Harmony on Earth: Science & Consciousness of Harmony

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*Postgraduate seminars on current Sacred Geometry research, discoveries & updates will be offered in harmonic future.*

Questions: [phi@schoolofsacredgeometry.org](mailto:phi@schoolofsacredgeometry.org)

# SG106.Ce StarWheel Blessing



SW#76. "Moon Chalice". [www.starwheels.com](http://www.starwheels.com)



## SG106.Cf Contact Info

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[phi@schoolofsacredgeometry.org](mailto:phi@schoolofsacredgeometry.org)  
PO Box 3714, Sedona, AZ 86340

**StarWheel Mandalas by Aya**

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**Our non-profit: [www.starwheelfoundation.org](http://www.starwheelfoundation.org)**

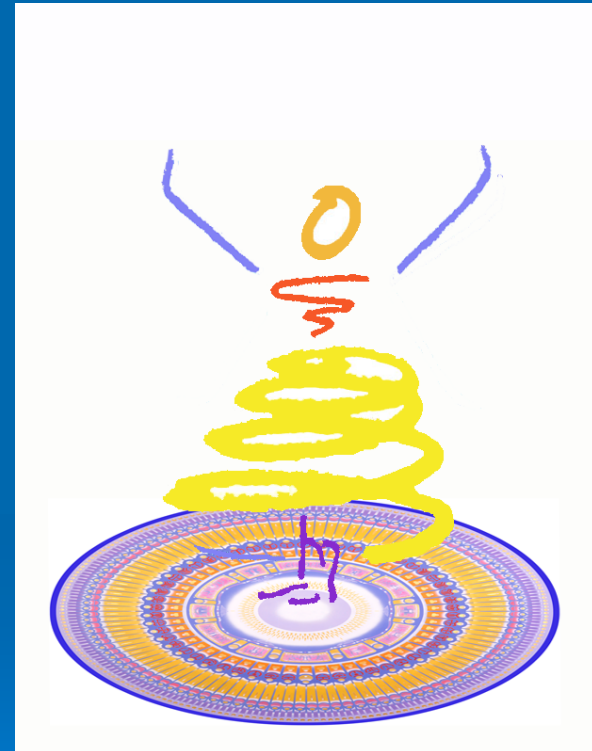
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**On Facebook: Aya Sheevaya**  
**FB Group: Sedona School of Sacred Geometry**



Φ celebration





## SG106.Cg About Aya

A native of France, Aya is a visionary artist and celebration yogi who has dedicated his life to serve humanity and to develop sacred arts education. In his late 20's, Aya realized that his professional life in the French diplomatic service was not fulfilling his heart's desires; he quit everything to go on an extended vision quest. His path took him around the world to visit a variety of sacred sites & cultures and to receive inspiration from many teachers.

In 1985, in Santa Monica, CA, Aya was gifted with a spiritual vision prompting him to create a series of 108 airbrushed neo-mandala paintings: the "StarWheels". The StarWheels, a happy family of vibratory flowers for the Earth, are looking for sacred spaces to be graced with their presence... ([www.starwheels.com](http://www.starwheels.com) / [www.starwheelmandalas.com](http://www.starwheelmandalas.com))

Moving to Sedona, Arizona, in 1997, Aya has been involved with sacred arts classes & events, mandala creation, Sedona guided tours, labyrinth making and Sacred Geometry teaching. Aya has presented several StarWheel art exhibits, has sponsored community awareness events at the Sedona Library, has developed, in collaboration with Gardens for Humanity, the Peace Garden arboretum at the Sedona Creative Life Center, was a speaker at the Sacred Geometry Conference (Sedona, 2004), co-designed several labyrinth sites (The Lodge at Sedona, Magos' Ranch...), and was on the management team of the Raw Spirit Festival in 2006 - 2008.

Realizing that Sedona was progressively becoming a global spiritual university for many seekers from around the world, Aya founded in 2005 the Sedona School of Sacred Geometry. The school is offering online access to Sacred Geometry PDF modules, with 17 modules completed so far. In the school's website, Aya states: *"We are living at the extraordinary and exciting times of a global transformation to a higher order of human consciousness... Sacred Geometry is the expression and resurrection of our deep innate wisdom, now awakening from a long sleep: seeing again the all-encompassing, fractal-holographic unity of nature, life and spirit... The keyword is HARMONY."* ([www.schoolofsacredgeometry.org](http://www.schoolofsacredgeometry.org))

Aya's visionary dream, supported by his non-profit educational organization, the StarWheel Foundation, is the co-creation of an international eco-village "The School of Celebratory Arts" - a green environment encouraging young people of all nations to develop their creative consciousness and thus contribute to a new, spirited, life-respecting global civilization on Earth. ([www.starwheelfoundation.org](http://www.starwheelfoundation.org)).

Since 2012, Aya is dancing the body divine, after his re-discovery of Yoga, Partner Yoga and AcroYoga. Aya is currently the AcroYoga.org Jam coordinator for Sedona and a teacher of yoga swing asanas.

Blessings in Anjali!