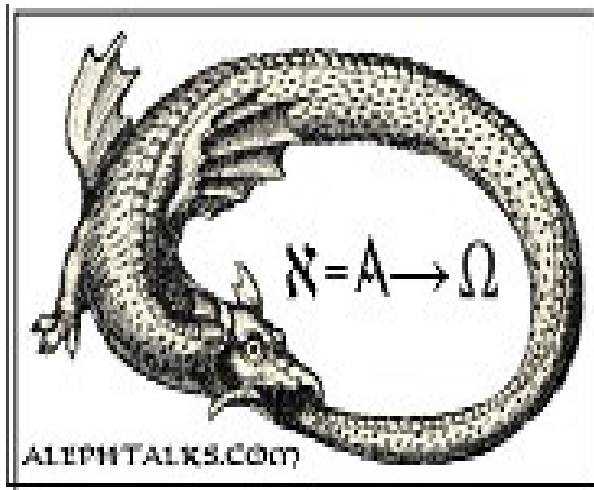
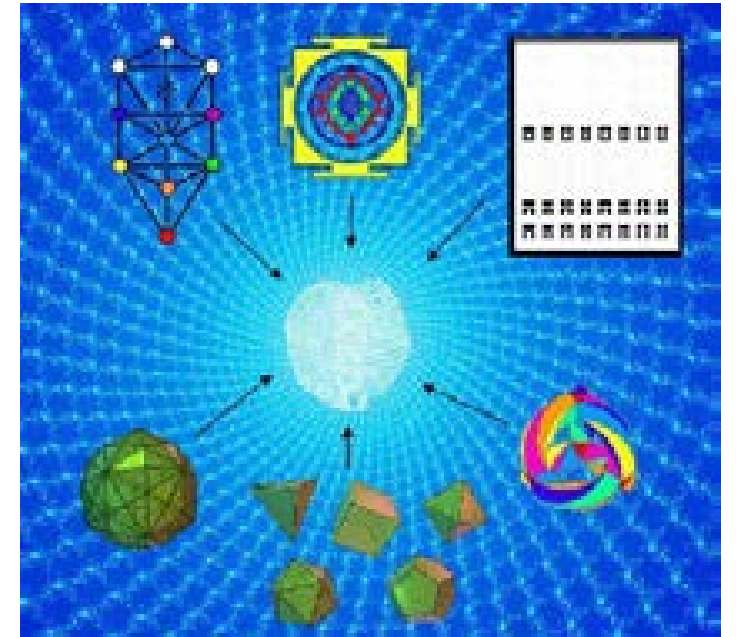


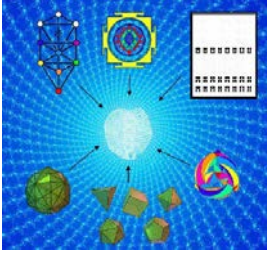
Is Mysticism Where Science, Art and Religion Meet?



Subject Ten Parallels and Intersections

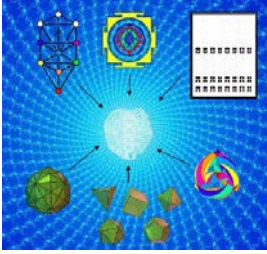


Overview



- The Unity of All Things (***The Theory of Everything***, revisited)
- Beyond the World of Opposites
- Space-Time
- The Dynamic Universe
- Emptiness and Form
- The Cosmic Dance
- Neutrinos, Quarks, Subquarks, and Strings
- Patterns of Change

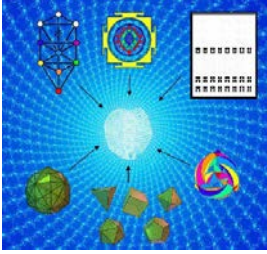
Overview(Continued)



- Interpretation
- **The Unification of Physics** (2014) by Fritjof Capra
- The Holistic Nature of the Seven Musical Scales
 - Inner/Outer Tree of Life
 - Sri Yantra
 - Super String
 - Superstrings as Sacred Geometry
 - Tree of Life
 - Platonic Solids
 - I Ching
 - Sri Yantra
 - Disdyakis Triacontahedron

William James:

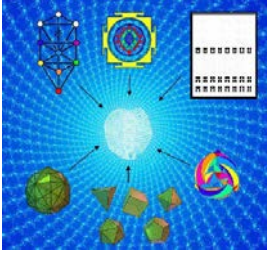
What Is a Mystical Experience?



- **William James (1842-1910)** was a distinguished American psychologist. In his book, **The Varieties of Religious Experience**, he wrote: “One may say, truly, I think, that personal religious experience has its root and center in mystical states of consciousness.”
- **Ineffability:** it defies expression.
- **Noetic quality**
 - Mystical experiences must be “states of insight into depths of truth unplumbed by the discursive intellect.
 - They are illuminations, revelations, full of significance and importance [and] carry with them a curious sense of authority.”

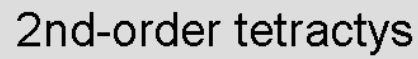
William James:

What Is a Mystical Experience?

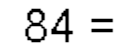


- **Transiency.** Mystical states cannot be sustained for long. Except in rare instances, half an hour, or at most an hour or two, seems to be the limit beyond which they fade into the light of common day. Memory of them is imperfect, but when they recur they are immediately recognized, and from one recurrence to another there is a development in the mystic of a deepening and increasingly rich inner life.
- **Passivity.** In mystical states of consciousness, “the mystic feels as if his own will were in abeyance, and indeed sometimes as if he were grasped and held by a superior power.” Mystical experience is a form of self-transcendence, and the mystic will often say that she or he has merged with something greater and that what we experience as “will” is also merged with that greater One. St. Teresa of Avila: a drop of rain falling into a great ocean (fresh water into salt water, but once merged, how can they be distinguished?)

•

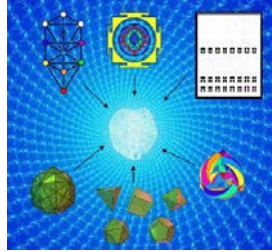
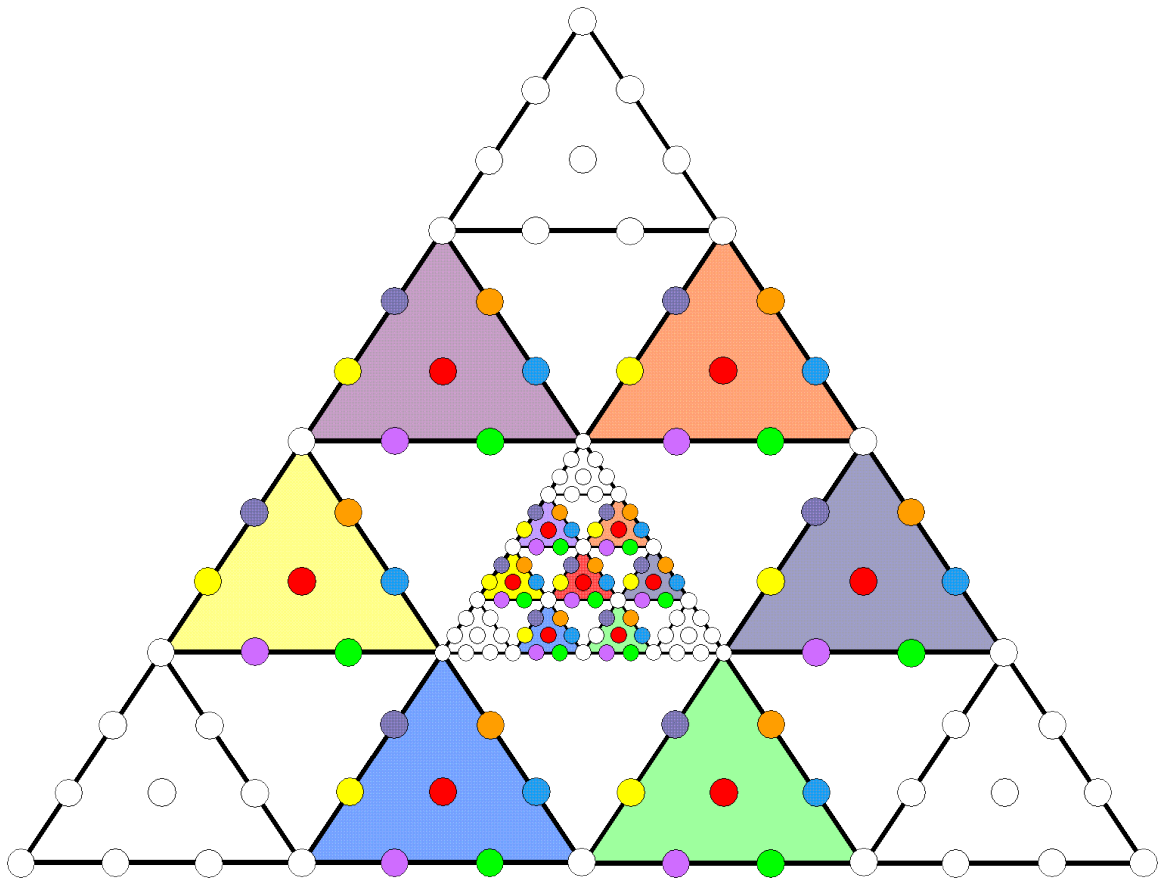


Number of yods surrounding centre = $84 = 1^2 + 3^2 + 5^2 + 7^2$



350 =

Cosmic Tetracys



THE EMERALD TABLET

Truly, without deceit, certain, and most veritable.

That which is Below corresponds to that which is Above,
and that which is Above corresponds to that which is Below
to accomplish the miracles of the One Thing.
And just as all things come from this One Thing
through the meditation of One Mind,
so do all created things originate from this One Thing
through Transformation.

Its father is the Sun;
Its mother the Moon.
The Wind carries it in its belly.
Its nurse is the Earth.
It is the origin of all,
the consecration of the Universe.
Its inherent strength is perfected,
if it is turned into Earth.

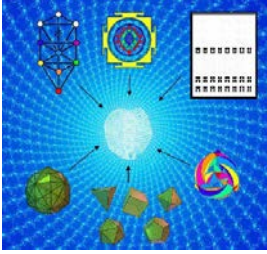
Separate the Earth from Heaven,
the Subtle from the Gross,
gently and with great ingenuity.
It rises from Earth to Heaven
and descends again to Earth,
thereby combining within its
the powers of both the Above and the Below.

Thus will you obtain the Glory of the Whole Universe.
All Obscurity will be clear to you.
This is the greatest Force of all powers,
because it overcomes every Subtle thing
and penetrates every Solid thing.

In this way was the Universe created.
From this will come many wondrous Applications,
because this is the Pattern.

Therefore am I called Thrice Greatest Hermes,
having all three parts of the wisdom of the Whole Universe.
Herein have I completely explained the Operation of the Sun.

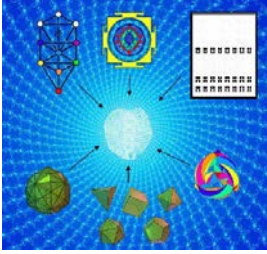
What Is An Esoteric Plane?



In esoteric cosmology, a **plane** is conceived as a subtle state, level, or region of reality, each plane corresponding to some type, kind, or category of being.

The concept may be found in religious and esoteric teachings—*e.g.* Vedanta (Advaita Vedanta), Ayyavazhi, shamanism, Hermeticism, Neoplatonism, Gnosticism, Kashmir Shaivism, Sant Mat/Surat Shabd Yoga, Sufism, Druze, Kabbalah, Theosophy, Anthroposophy, Rosicrucianism (Esoteric Christian), Eckankar, Ascended Master Teachings, etc.—

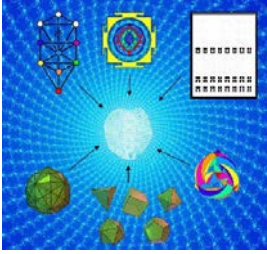
What Is An Esoteric Plane?



which propound the idea of a whole series of subtle planes or worlds or dimensions which, from a center, interpenetrate themselves and the physical planet in which we live, the solar systems, and all the physical structures of the universe. This interpenetration of planes culminates in the universe itself as a physical structured, dynamic and evolutive expression emanated through a series of steadily denser stages, becoming progressively more material and embodied.

The emanation is conceived, according to esoteric teachings, to have originated, at the dawn of the universe's manifestation, in *The Supreme Being* who sent out—from the unmanifested *Absolute* beyond comprehension—the dynamic force of creative energy, as *sound-vibration* ("the Word"), into the abyss of space. Alternatively, it states that this dynamic force is being sent forth, through the ages, framing all things that constitute what we inhabit in the universe.

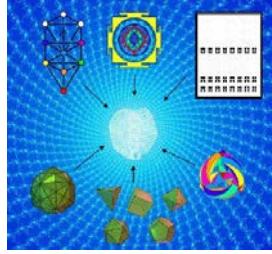
Origin of the Term Esoteric Plane



The concept of planes of existence might be seen as deriving from shamanic and traditional mythological ideas of a vertical world-axis—for example a cosmic mountain, tree, or pole (such as Yggdrasil or Mount Meru)—or a philosophical conception of a Great Chain of Being, arranged metaphorically from God down to inanimate matter.

However the original source of the word *plane* in this context is the late Neoplatonist Proclus, who refers to *to platos*, "breadth", which was the equivalent of the 19th-century theosophical use. An example is the phrase *en to psychiko platei*.

Directly equivalent concepts in Indian thought are lokas and bhuvanas. In Hindu cosmology, there are many lokas or worlds, that are identified with both traditional cosmology and states of meditation.



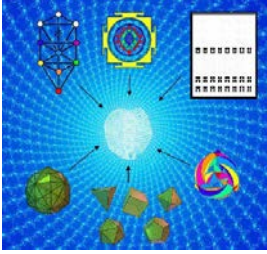
Origin of the Term Esoteric Plane

Planes of existence may have been referred to by the use of the term corresponding to the word "egg" in English. For example, the Sanskrit term Brahmanda translates to "The entire creation" as opposed to the lazy inference "The Egg of Creation". Certain Puranic accounts posit that the Brahmanda is the superset of a set of fractal smaller Eggs, as is seen in the assertion of the equivalence of the Brahmanda and the Pinda.[2]

The ancient Norse mythology gave the name "Ginnungagap" to the primordial "Chaos", which was bounded upon the northern side by the cold and foggy "Niflheim"—the land of mist and fog—and upon the south side by the fire "Muspelheim". When heat and cold entered into space which was occupied by Chaos or Ginnungagap, they caused the crystallization of the visible universe.

In the medieval West and Middle East, one finds reference to four worlds (*olam*) in Kabbalah, or five in Sufism (where they are also called *tanazzulat*; "descents"), and also in Lurianic Kabbalah. In Kabbalah, each of the four or five worlds are themselves divided into ten sefirot, or else divided in other ways.

Esoteric Conceptions



The alchemists of the Middle Ages proposed ideas about the constitution of the universe through a hermetic language full of esoteric words, phrases, and signs designed to cloak their meaning from those not initiated into the ways of alchemy. In his "Physica" (1633), the Rosicrucian alchemist Jan Baptist van Helmont, wrote: "*Ad huc spiritum incognitum Gas voco*" q.e., "This hitherto unknown Spirit I call Gas." Further on in the same work he says, "This vapor which I have called Gas is not far removed from the Chaos the ancients spoke of." Later on, similar ideas would evolve around the idea of aether.

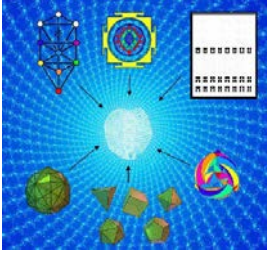
In the late 19th century, the metaphysical term "planes" was popularised by the theosophy of H. P. Blavatsky, who in *The Secret Doctrine* and other writings propounded a complex cosmology consisting of seven planes and subplanes, based on a synthesis of Eastern and Western ideas.

From theosophy the term made its way to later esoteric systems such as that of Alice Bailey, who was very influential in shaping the worldview of the New Age movement.

The term is also found in some Eastern teachings that have some Western influence, such as the cosmology of Sri Aurobindo and some of the later Sant Mat, and also in some descriptions of Buddhist cosmology.

The teachings of Surat Shabd Yoga also include several planes of the creation within both the macrocosm and microcosm, including the Bramanda egg contained within the Sach Khand egg. Max Theon used the word "States" (French *Etat*) rather than "Planes", in his cosmic philosophy, but the meaning is the same.

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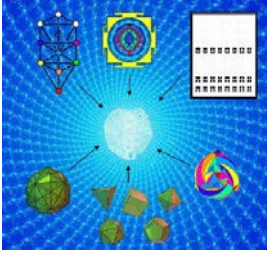
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Esoteric Conceptions

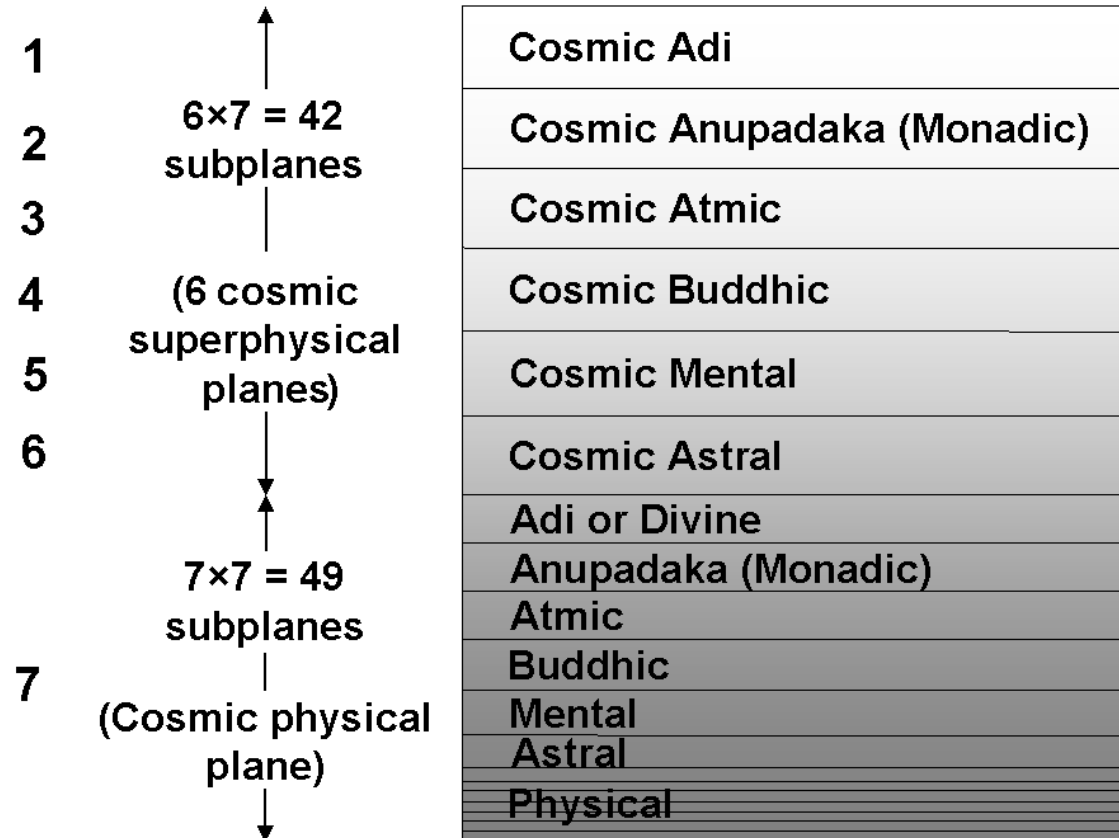
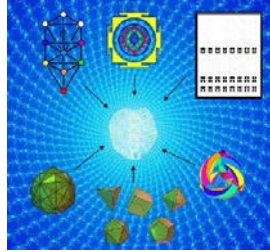


The planes in Theosophy were further systematized in the writings of C.W. Leadbeater and Annie Besant.

In the early 20th century, Max Heindel presented in *The Rosicrucian Cosmo-Conception* a cosmology related to the scheme of evolution in general and the evolution of the solar system and the Earth in particular, according to the Rosicrucians.

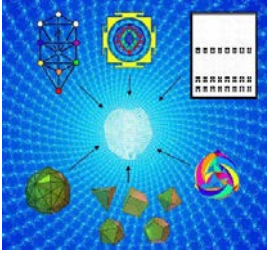
He establishes, through the conceptions presented, a bridge between modern science (currently starting research into the subtler *etheric* plane of existence behind the physical) and religion, in order that this last one may be able to address man's *inner* questions raised by scientific advancement.

Cosmic Tetracycs



The mathematical scheme expressed in the Cosmic Tetractys has the following *natural*, Theosophical interpretation: Theosophy teaches that there are seven planes of consciousness. The most material plane is the physical plane. This is the physical universe, the space-time continuum, revealed by the five senses and by science's instrumental extensions of them, such as the microscope and the telescope. Beyond (or, rather, interpenetrating) it are the astral, mental, buddhic, atmic, anupadaka (monadic) & adi (divine) planes.* Each plane is divided into seven subplanes, so that the seven planes have ($7 \times 7 = 49$) subplanes. They constitute the "cosmic physical plane."

Cosmic Tetracys

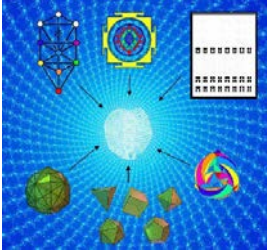


Beyond them are six, still higher, cosmic superphysical planes, each composed of seven subplanes, totalling 42 subplanes. This means that the seven cosmic planes comprise (**49**+42=91) subplanes, where

$$91 = 12 + 22 + 32 + 42 + 52 + 62.$$

The lowest seven subplanes constitute the physical plane. There are 84 subplanes in the 12 superphysical planes, where $84 = 41 + 42 + 43 = 22 + 42 + 82$. This has a remarkable musical analogue, for the seven diatonic musical scales contain 12 types of notes between the tonic and the octave, and their intervals contain 84 repetitions that belong to the Pythagorean scale.

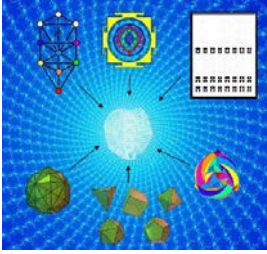
Cosmic Tetracycs



Comparing this with the 91 coloured, hexagonal triangles making up the Cosmic Tetractys, we see that each such triangle denotes a subplane — a different state of reality. They are all expressions of the seven Sephiroth of Construction, as manifested in the seven cosmic planes of consciousness. This is the Pythagorean representation of the Cosmic Whole — both physical *and* superphysical reality. The correspondence between the seven Sephiroth of Construction and the seven planes of consciousness is not merely a formal one. The latter are the manifestation of the former

Plane	Sepiroth
Space-time	Malkuth
Astral	Yesod
Mental	Hod
Buddhic	Netzach
Atmic	Tiphareth
Anupadaka	Geburah
Adi	Chesed

Cosmic Tetracycs

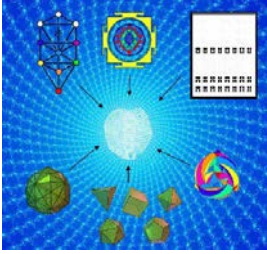


This is the map of all levels of reality that embodies the hermetic axiom "**As above, so below**" expressed in the Emerald Tablet discussed previously.

As any student of Kabbalah understands, the psycho-spiritual aspects of the Sephiroth in Atziluth (Archetypal World), Beriah (Creative World), Yetzirah (Formative World) & Assiyah (World of Action) are found in a human being, whose evolutionary journey to God spans all these planes of consciousness, taking the person potentially far beyond the realm of heaven that Western religions declare awaits the faithful and the good — even beyond the ineffable state of Nirvana that is the goal of Buddhism.

All levels are mapped by sacred geometries, as they are representations of the Divine Whole. The 12 types of notes between the tonic and octave of the seven diatonic scales are the musical counterparts of the 12 superphysical planes of consciousness. The first six types of notes and their six inversions are the respective parallels of the six higher planes of the cosmic physical plane (Astral→Adi) and their six cosmic counterparts. The six Yang meridians and the six Yin meridians familiar to students of acupuncture are another parallel (this is an analogy between the 12 types of notes and the 12 meridians).

Music

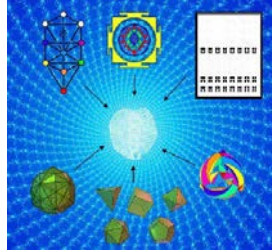


The seven species of musical octaves comprise 14 different notes. In order of increasing tone ratios, they are:

1 256/243 9/8 32/27 81/64 4/3 1024/729 729/512 3/2 128/81
27/16 16/9 243/128 2

(black numbers denote notes belonging to the Pythagorean scale and red numbers denote non-Pythagorean notes).

Music



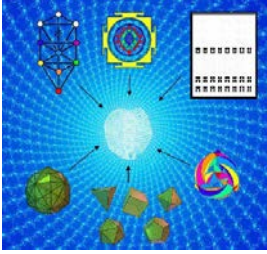
Note	Tone Ratio	Pythagorean
Unison	1/1	0
Minor Second	256/243	90.22
Major Second	9/8	203.91
Minor Third	32/27	294.13
Major Third	81/64	407.82
Perfect Fourth	4/3	498.04
Diminished Fifth	1024/729	588.27
Augmented Fourth	729/512	611.73
Perfect Fifth	3/2	701.96
Minor Sixth	128/81	792.18
Major Sixth	27/16	905.87
Minor Seventh	16/9	996.09
Major Seventh	243/128	1109.78
Octave	2/1	1200.00

10/23/2020

Is Mysticism Where Science, Art and
Religion Meet?

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Music and Tree of Life

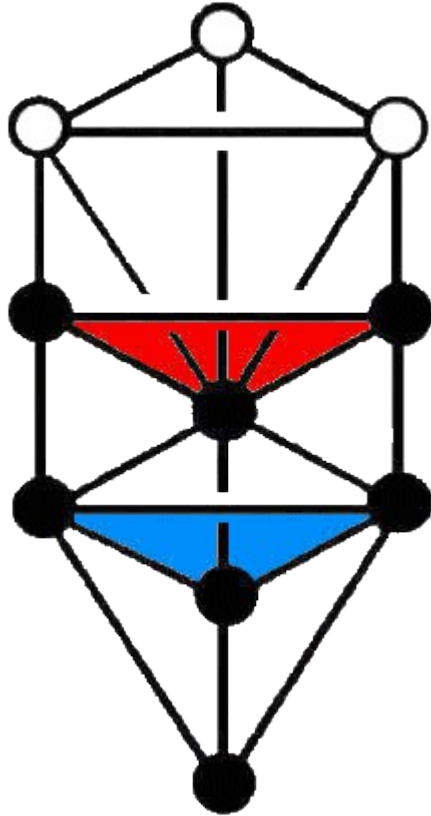
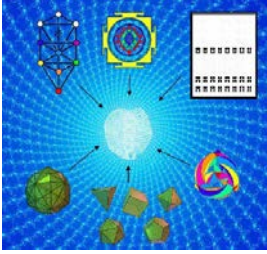


$T = 9/8$ is the Pythagorean tone interval & $L = 256/243$ is the Pythagorean leimma (from the Greek word for "leftover", this being the interval between the penultimate note of the Pythagorean octave with tone ratio $243/128$ and the first note of the next octave with tone ratio 2).

The 12 notes between the tonic & octave comprise a triplet of Pythagorean notes, a triplet of non-Pythagorean notes and the two triplets of their corresponding inversions.

This (1,3,3) pattern of a set of seven notes and their seven inversions is fundamental to holistic systems because it is the manifestation in them of the seven archetypal creative, divine principles called the Sephiroth of Construction, which form two triads and a single Sephirah, Malkuth, at the foot of the Tree of Life

Music and Tree of Life



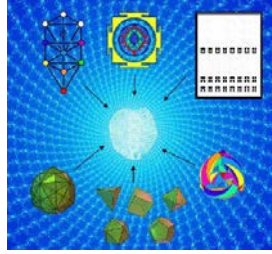
Chesed-Geburah-Tiphareth

Netzach-Hod-Yesod

Malkuth

The counterpart of this (1,3,3) pattern in the tetractys is its central hexagonal yod and the two triangular arrays of hexagonal yods that intersect to form a Star of David/Sign of Vishnu

Seven Musical Scales



Types of intervals in the 7 musical scales

1

256/243

9/8

32/27

81/64

4/3

1024/729

2

243/128

16/9

27/16

128/81

3/2

729/512

1 × 2 = 2

256/243 × 243/128 = 2

9/8 × 16/9 = 2

32/27 × 27/16 = 2

81/64 × 128/81 = 2

4/3 × 3/2 = 2

1024/729 × 729/512 = 2

Numbers of intervals in the 7 musical scales
(number of notes in brackets)

Interval

256/243

9/8

32/27

81/64

4/3

1024/729

Number

14 (2)

35 (5)

24 (4)

18 (3)

30 (6)

4 (1)

Interval

243/128

16/9

27/16

128/81

3/2

729/512

Number

4 (2)

10 (5)

12 (4)

9 (3)

24 (6)

5 (1)

Total = 125 (21)

Total = 64 (21)

Number of paired notes+intervals

Interval

256/243

9/8

32/27

81/64

4/3

1024/729

Number

2+2

5+5

4+8

3+6

6+18

1+3

Interval

243/128

16/9

27/16

128/81

3/2

729/512

Number

2+2

5+5

4+8

3+6

6+18

1+3

Total = 21+42=63

Total = 21+42=63

Number of unpaired intervals

Interval

256/243

9/8

32/27

81/64

4/3

1024/729

Number

10

25

12

9

6

0

Interval

243/128

16/9

27/16

128/81

3/2

729/512

Number

0

0

0

0

0

1

Total = 62

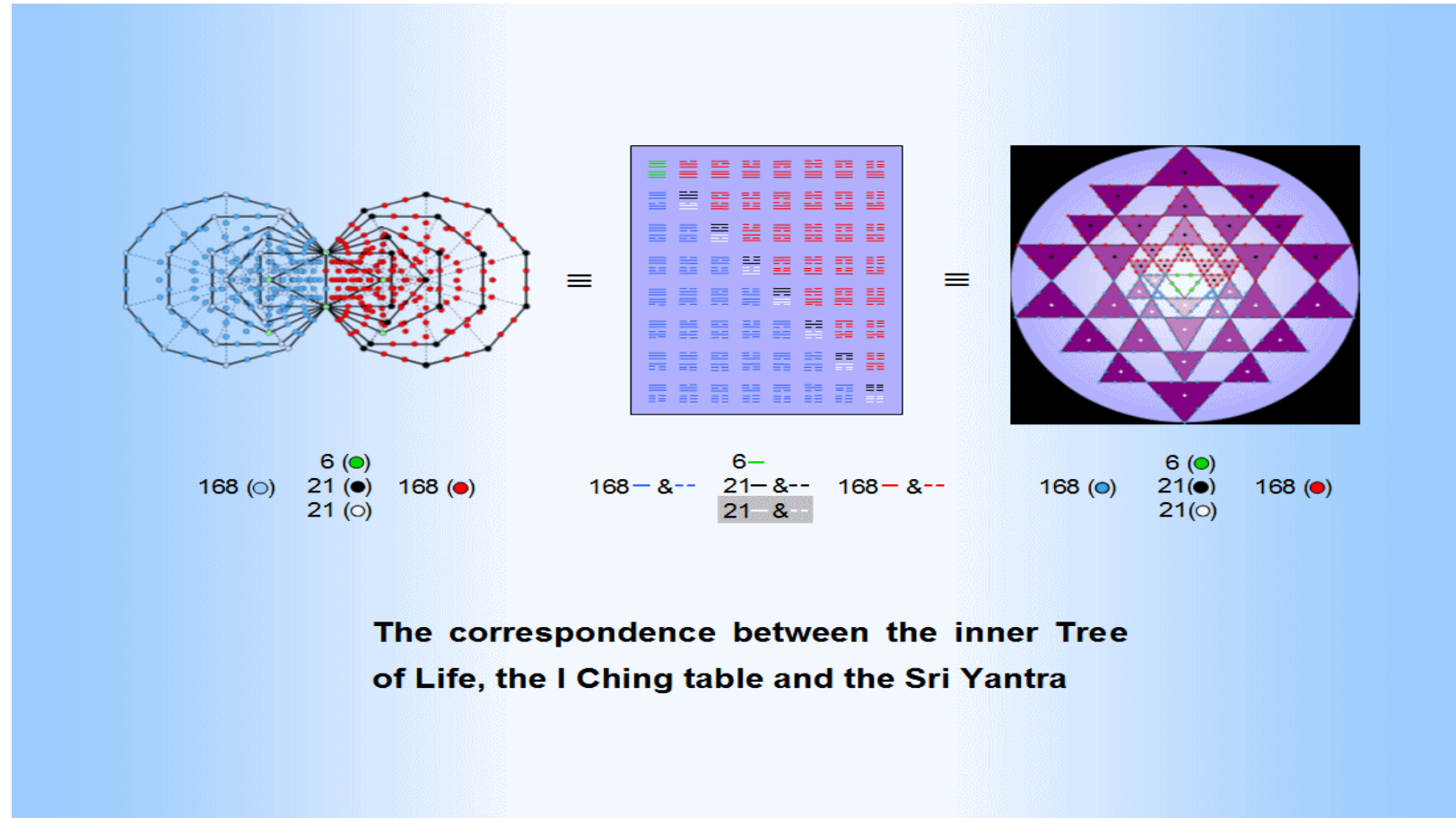
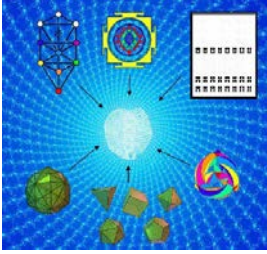
Total = 1

63

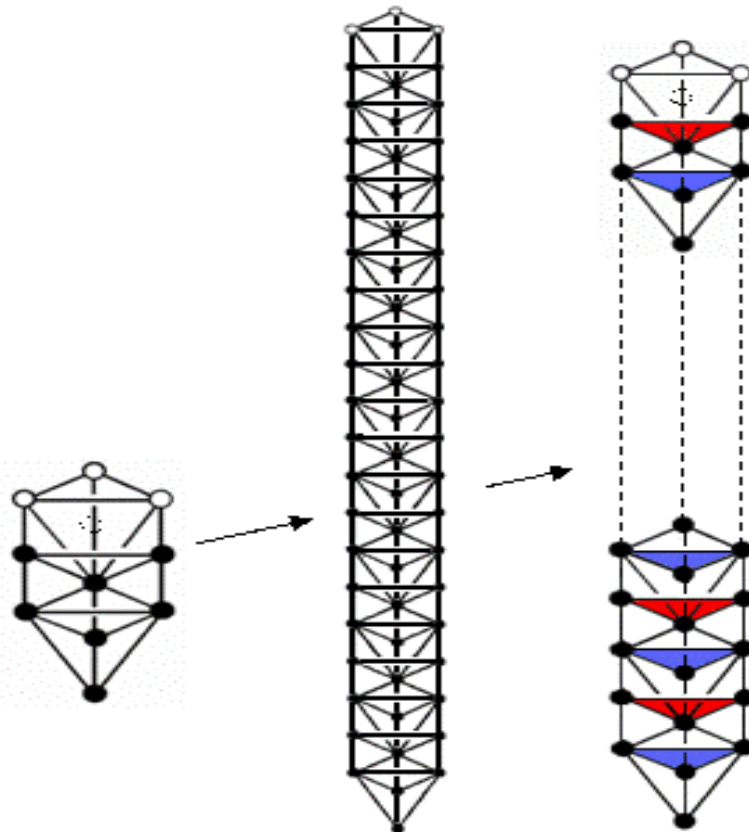
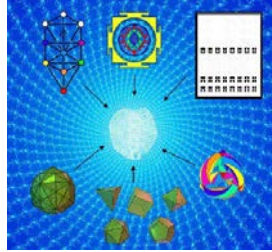
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Equivalence of Inner Tree of Life, I-Ching, and Sri Yantra



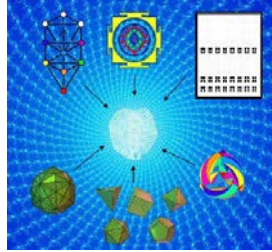
Equivalence of Tree of Life and DNA/RNA



Replacing each Sephirah of a Tree of Life by a Tree of Life generates 10 Trees of Life with **64** SLs. Replacing these SLs by Trees of Life generates $(32+32=64)$ Trees of Life with $(192+192=384)$ SLs grouped into $(64+64=128)$ triads. They correspond to the **64** codons and **64** anticodons of human RNA. The 32 pairs of red & blue triads in the uppermost 32 Trees of Life signify the 32 codons of mRNA and their 32 complements. The lowest 32 pairs of red & blue triads signify the 32 anticodons of tRNA and their 32 complements. The **64** codon pattern in human DNA has a Tree of Life basis, the 64×3 pattern of SLs in each set of 32 Trees corresponding to the **64** sets of three nitrogen bases in mRNA and their complements in tRNA.

More generally, holistic systems possess a $2 \times 64 \times 3$ pattern. The number **64** refers to the **64** Trees representing the generic Tree of Life and the number 3 refers to their three pillars, whilst the number 2 expresses the 5:5 division of the 10 Sephiroth.

Sacred Geometry and Music



First (6+6) enfolded polygons

3 ● 189 yods 3 ○ 189 yods

Inner Tree of Life

3 ● corners of hexagon
189 geometrical elements
surround centres of 7 polygons

3 ○ corners of hexagon
189 geometrical elements
surround centres of 7 polygons

Sri Yantra

3 ● 3 ○
189 ● 189 ○

64 hexagrams

3 — 3 —
189 — & — 189 — & —

5 Platonic solids

axis, edge, centre, edge

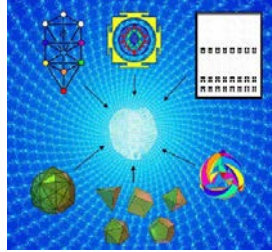
On average, in each half surrounding the centre are:

- 3 yods on axis.
- 189 *boundary* yods surround axis.

Type A triangle
(For clarity, the central hexagonal yods are omitted).

The inner Tree of Life, the Sri Yantra, the 64 hexagrams and the 5 Platonic solids embody the pattern of intervals of the seven diatonic scales (Church modes)

Sacred Geometry and Musical Scales



Sequences of intervals in the 7 musical scales

$$T = 9/8, \quad L = 256/243$$

7. T T L T T T L
6. L T T L T T T
5. T L T T L T T
4. T T L T T L T
3. T T T L T T L
2. L T T T L T T
1. T L T T T L T

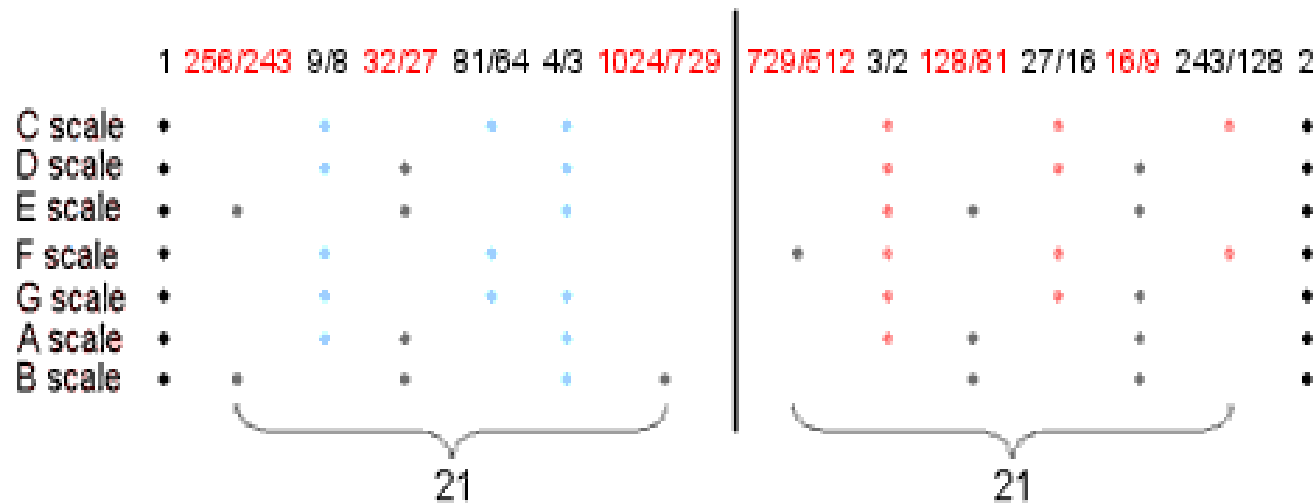
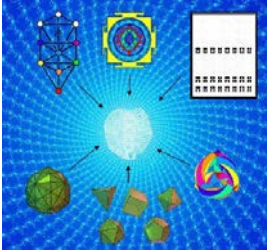
- Hypolydian (mode 6, C scale)
 Hypophrygian (mode 4, B scale)
 Hypodorian (mode 2, A scale)
 Mixolydian (mode 7, G scale)
 Lydian (mode 5, F scale)
 Phrygian (mode 3, E scale)
 Dorian (mode 1, D scale)

Musical scale	Tone ratio							
D scale	1	9/8	32/27	4/3	3/2	27/16	16/9	2
E scale	1	256/243	32/27	4/3	3/2	128/81	16/9	2
F scale	1	9/8	81/64	729/512	3/2	27/16	243/128	2
G scale	1	9/8	81/64	4/3	3/2	27/16	16/9	2
A scale	1	9/8	32/27	4/3	3/2	128/81	16/9	2
B scale	1	256/243	32/27	4/3	1024/729	128/81	16/9	2
C scale	1	9/8	81/64	4/3	3/2	27/16	243/128	2

(Tone ratios of non-Pythagorean notes are written in red)

C	D					E	F		G	A		B	C'
1	256/243	9/8	32/27	81/64	4/3	1024/729	729/512	3/2	128/81	27/16	16/9	243/128	2

Pythagorean Notes and Tree of Life



Number of Pythagorean notes $\leq 4/3 = 14$ (•)

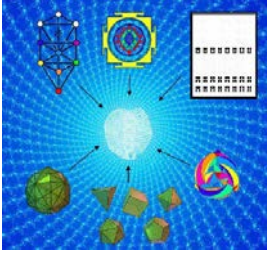
Number of Pythagorean notes $\geq 3/2 = 12$ (•)

Number of Pythagorean notes = 26

Number of non-Pythagorean notes = 16 (•)

Total = 42

Pythagorean Notes and Tree of Life



The **26:16** division of Pythagorean and non-Pythagorean notes and the **14:12** division in the **26** Pythagorean notes and their inversions manifest in sacred geometries as well. Article 4 shows how the Godnames of the 10 Sephiroth mathematically prescribe the first 6 enfolded polygons as a holistic structure.

For example, they have **26** corners, both sets of the first 6 polygons having **50** corners, where **26** is the number of YAHWEH, the Godname of Chokmah, and **50** is the number of ELOHIM, the Godname of Binah, which follows Chokmah in the Tree of Life.

The last two enfolded polygons (octagon & decagon) have 14 corners outside the root edge, the first four enfolded polygons having 12 corners. Other combinations of polygons also display this division. Which combination is the "correct" one is irrelevant to the present discussion.

The point is that this division exists *naturally* in the six polygons. Its counterpart in the Sri Yantra is just as natural. The nine parent triangles that generate the 42 triangles through their overlap have 27 corners of which one is the nadir of the central triangle and **26** are outermost corners of these 42 triangles. They comprise the 14 of the **15** light blue corners of the five downward-pointing triangles with blue sides representing the Shakti ("feminine") aspect of creation and the 12 light red corners of the four upward-pointing triangles with red sides that represent the Siva ("masculine") aspect.

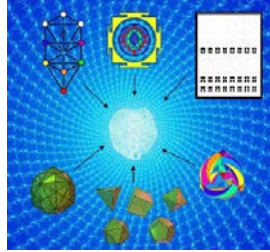
The 12 Pythagorean notes that span the $4/3$ interval between the perfect fifth and the octave therefore correspond to the Siva principle, whilst the 14 Pythagorean notes spanning the $4/3$ interval between the perfect fourth and the tonic correspond to the Shakti principle.

This is consistent with the octave representing the complete domain that is divided up into the eight notes, for the undivided whole before division is always masculine in the metaphysical sense, whilst the whole patterned into parts is always feminine. The Tree of Life, the point of Kether is the point of the Supernal Triad, completed by Binah (the "Great Mother") as its third corner. The point of Kether is the point of the Supernal Triad, completed by Binah (the "Great Mother") as its third corner.

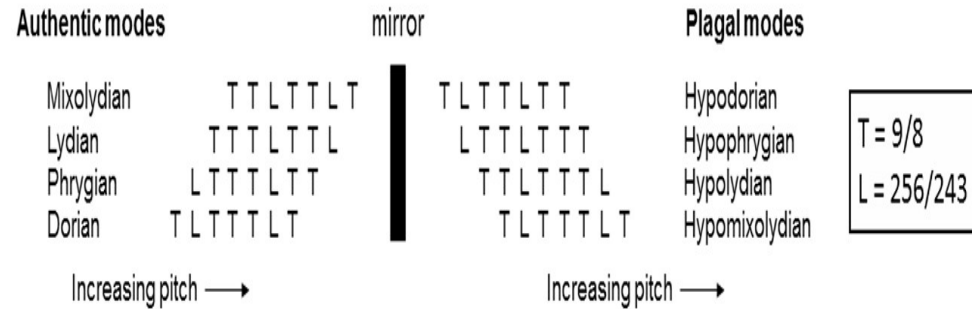
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Church Modes and Pythagorean Notes

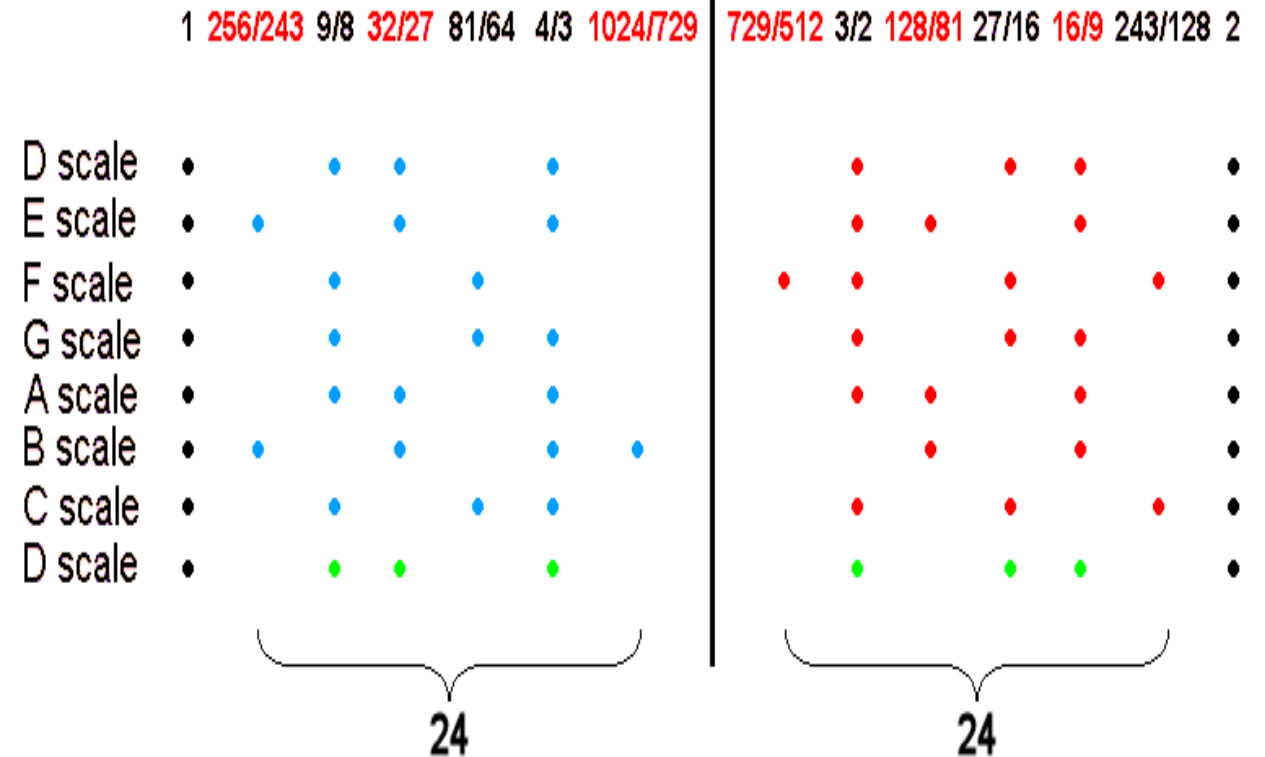


Hypomixolydian	1	9/8	32/27	4/3	3/2	27/16	16/9	2
Hypolydian	1	9/8	81/64	4/3	3/2	27/16	243/128	2
Hypophrygian	1	256/243	32/27	4/3	1024/729	128/81	16/9	2
Hypodorian	1	9/8	32/27	4/3	3/2	128/81	16/9	2
Mixolydian	1	9/8	81/64	4/3	3/2	27/16	16/9	2
Lydian	1	9/8	81/64	729/512	3/2	27/16	243/128	2
Phrygian	1	256/243	32/27	4/3	3/2	128/81	16/9	2
Dorian	1	9/8	32/27	4/3	3/2	27/16	16/9	2

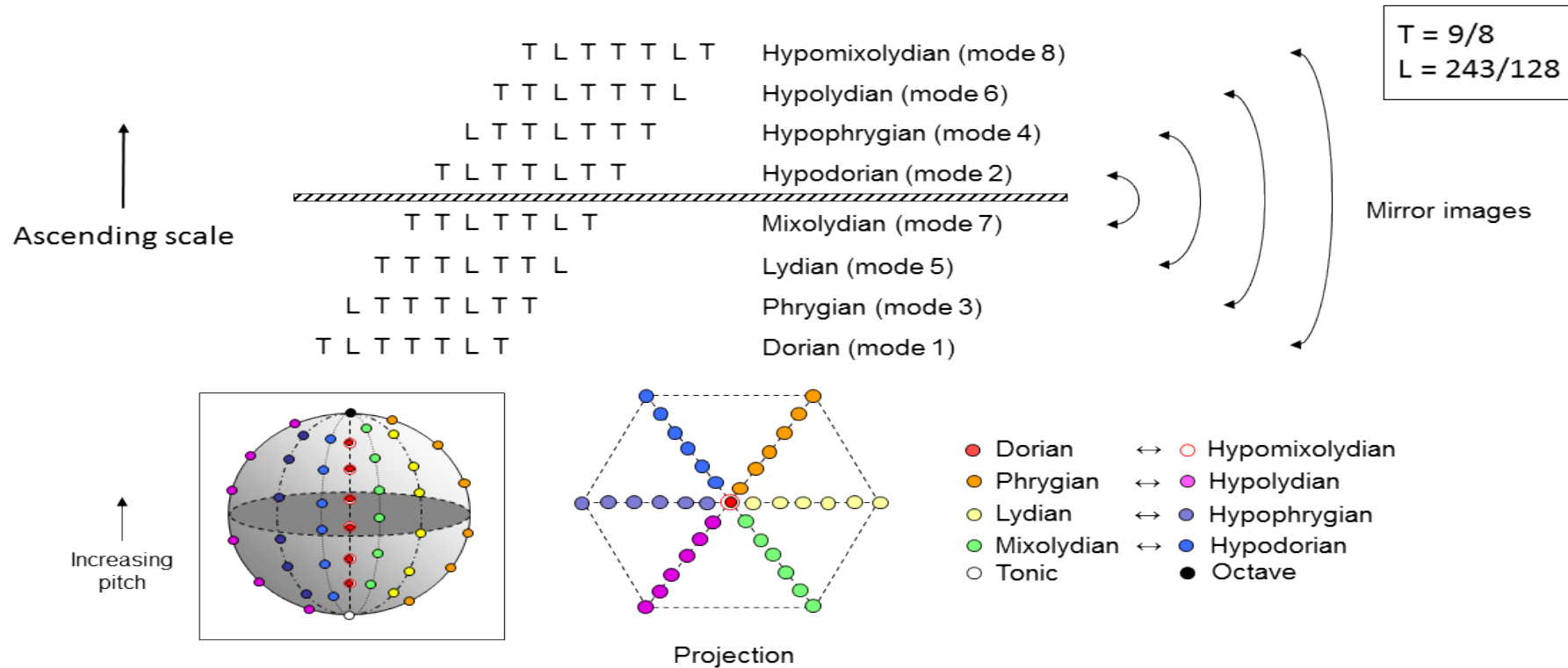
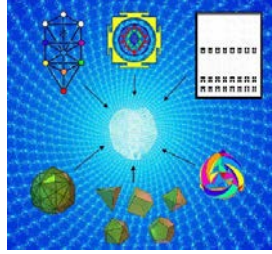
(White cells contain tone ratios of non-Pythagorean notes)

4 Authentic modes have 24 notes (16 Pythagorean & 8 non-Pythagorean).
 4 Plagal modes have 24 notes (14 Pythagorean & 10 non-Pythagorean).

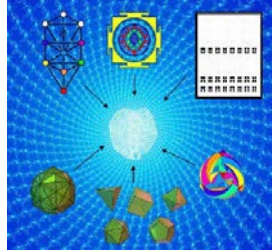
(Tone ratios of non-Pythagorean notes are written in red)



Church Modes and the Tree of Life



The spherical geometry of the eight Church modes. Each point on a great circle denoting a note is diametrically opposite another on the same circle belonging to the mode whose interval pattern is its mirror image (denoted by ↔). The Dorian (first) and Hypomixolydian (last) modes have the *same* pattern of intervals that is a mirror image of itself. Their notes lie along the axis of the sphere, whilst the notes of the 6 other scales lie on 3 great circles rotated 120° apart about this axis.



The Tree of Life and Music Scales

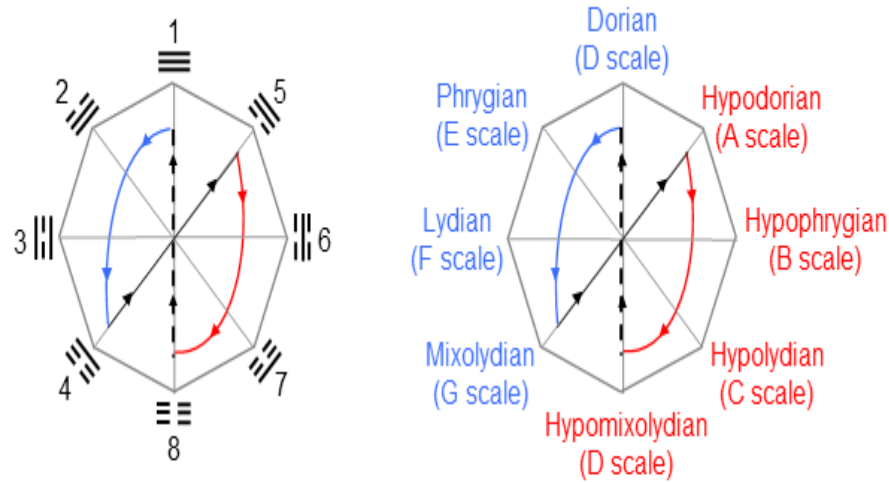
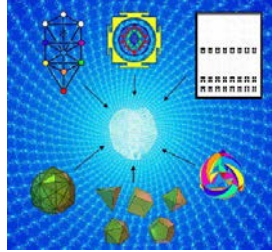
**EHYEH (AHIH), the Godname of Kether, prescribes the
21 notes in the 7 diatonic scales and their 21 inversions**

$$\text{אהיה} = 21$$

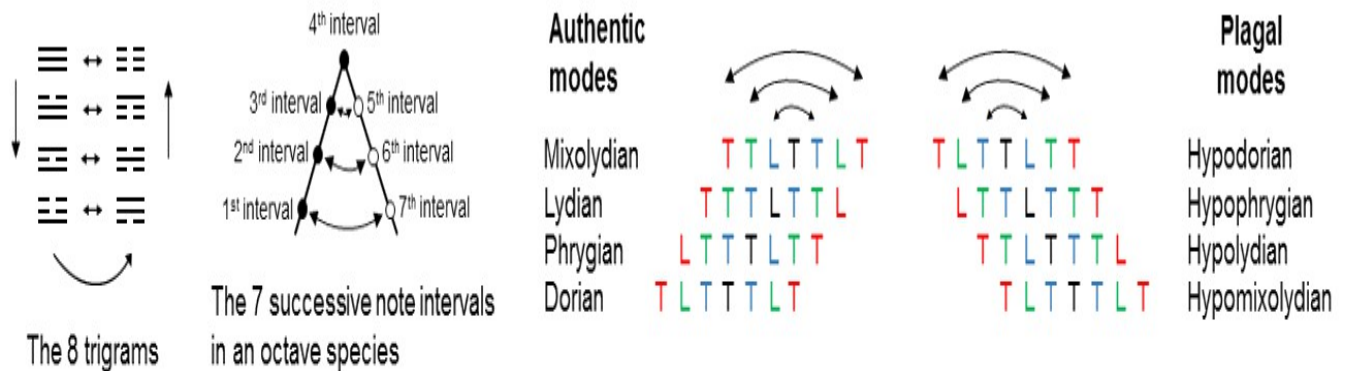
	Notes up to 1024/729	Inversions
A (א) = 1 :	1 ×1024/729	1 ×729/512
H (ה) = 5 :	5 ×9/8	5 ×16/9
I (י) = 10 :	6 ×4/3 + 4 ×32/27	6 ×3/2 + 4 ×27/16
H (ה) = 5 :	2 ×256/243 + 3 ×81/64	3 ×128/81 + 2 ×243/128

*(Numbers in **boldface** are either letter values of EHYEH or add up to a letter value)*

I-Ching and Church Musical Scales

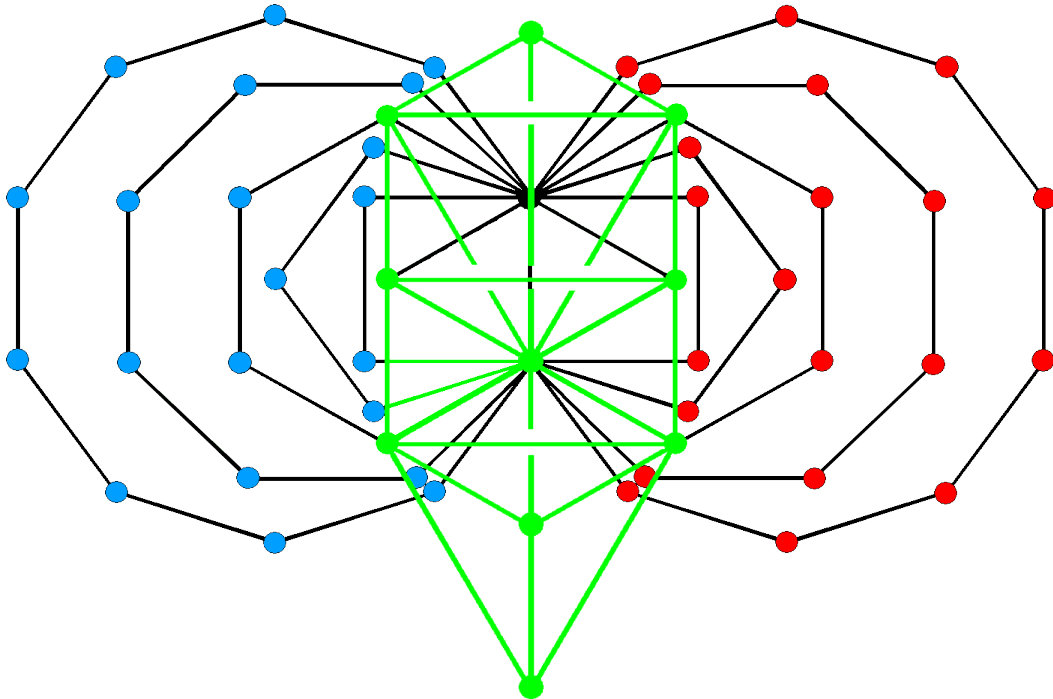
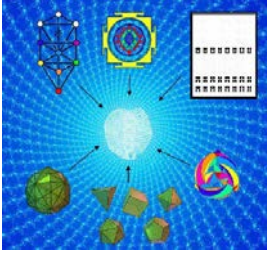


The eight Church modes are the musical counterparts of the eight trigrams. The four authentic modes: Dorian, Phrygian, Lydian & Mixolydian correspond, respectively, to the Ch'ien, Tui, Li and Chen trigrams. The four plagal modes: Hypodorian, Hypophrygian, Hypolydian & Hypomixolydian correspond, respectively, to the Sun, K'an, Ken & K'un trigrams. Diametrically opposite pairs of trigrams have their yin & yang lines interchanged. Similarly, diametrically opposite modes have patterns of intervals that are mirror images of each other.



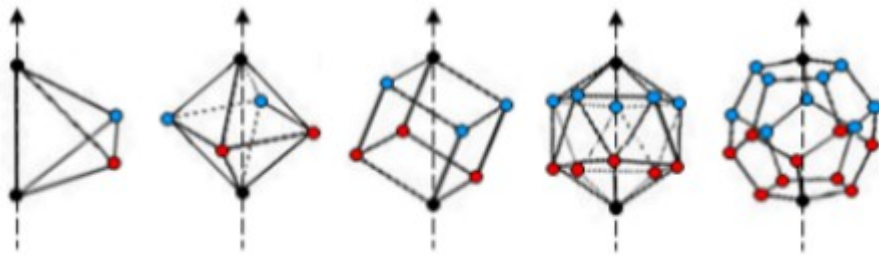
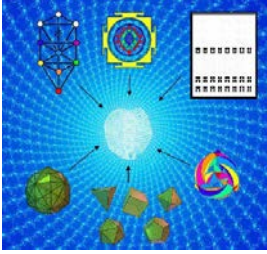
The three rows of a trigram correspond to the first/last three note intervals of a Church musical mode. Pairs of authentic & plagal modes whose sequences of note intervals are mirror images of each other correspond to pairs of trigrams whose lines (Yang) and broken lines (Yin) are interchanged.

Inner Tree of Life Sacred Geometry & Music



The inner Tree of Life consists of (7+7) enfolded, regular polygons with 70 corners. As the dodecagon (the last of these types of polygons) has 10 corners outside the shared root edge, the first (6+6) enfolded polygons have **50** corners. The 7 polygons on the right have 24 corners outside the root edge, as do the 7 polygons on the left. Of these corners, three coloured green coincide with the positions of Sephiroth in the outer Tree of Life. They are the corner of the triangle (Chesed & Geburah), the tops of the two hexagons (Chokmah & Binah) and their lowest corners (Netzach & Hod). This means that **21** red corners and **21** blue corners are intrinsic to the inner Tree of Life. They correspond to the **21** notes and their **21** inversions between the tonic and octave of the 7 diatonic scales. The (3+3) green corners denote the 2nd, 3rd & 4th notes in the Hypomixolydian mode and their inversions. These 6 notes are identical to the six notes between the tonic and octave of the Dorian mode because these two modes have the same pattern of note intervals. We see that corners shared by the outer and inner Trees of Life denote the notes of the eight modes, whilst corners intrinsic to the inner Tree of Life denote the notes of the seven distinct octave species. As pointed out above, each set of three notes consists of two Pythagorean notes and one non-Pythagorean note. This corresponds to how the top and bottom corners of the hexagons coincide with Sephiroth on either side pillar that are shared between adjacent Trees of Life, whilst the third corner (the corner of the triangle) coincides with Chesed or Geburah, both of which belong only to one Tree. The endpoints of the root edge denote the tonic and octave common to all the scales. They correspond to the North and South Poles of the spherical representation of the eight Church modes, which was discussed earlier

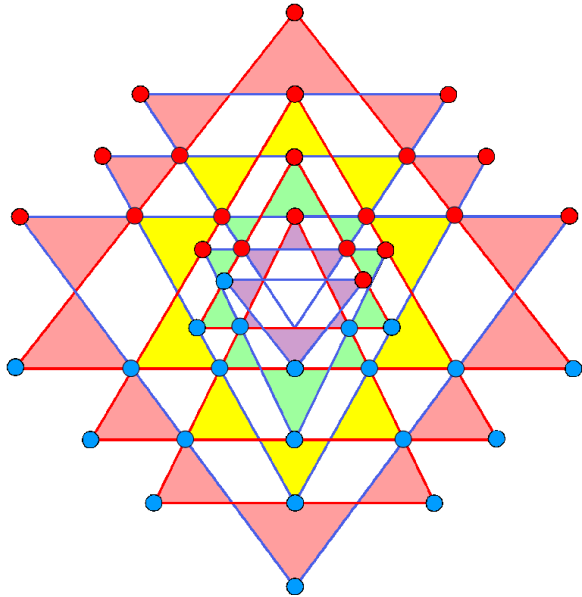
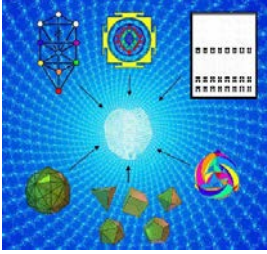
Platonic Solid Sacred Geometry and Music



20 (●) vertices and their 20 inversions (●) surround axes passing through two opposite (●) vertices

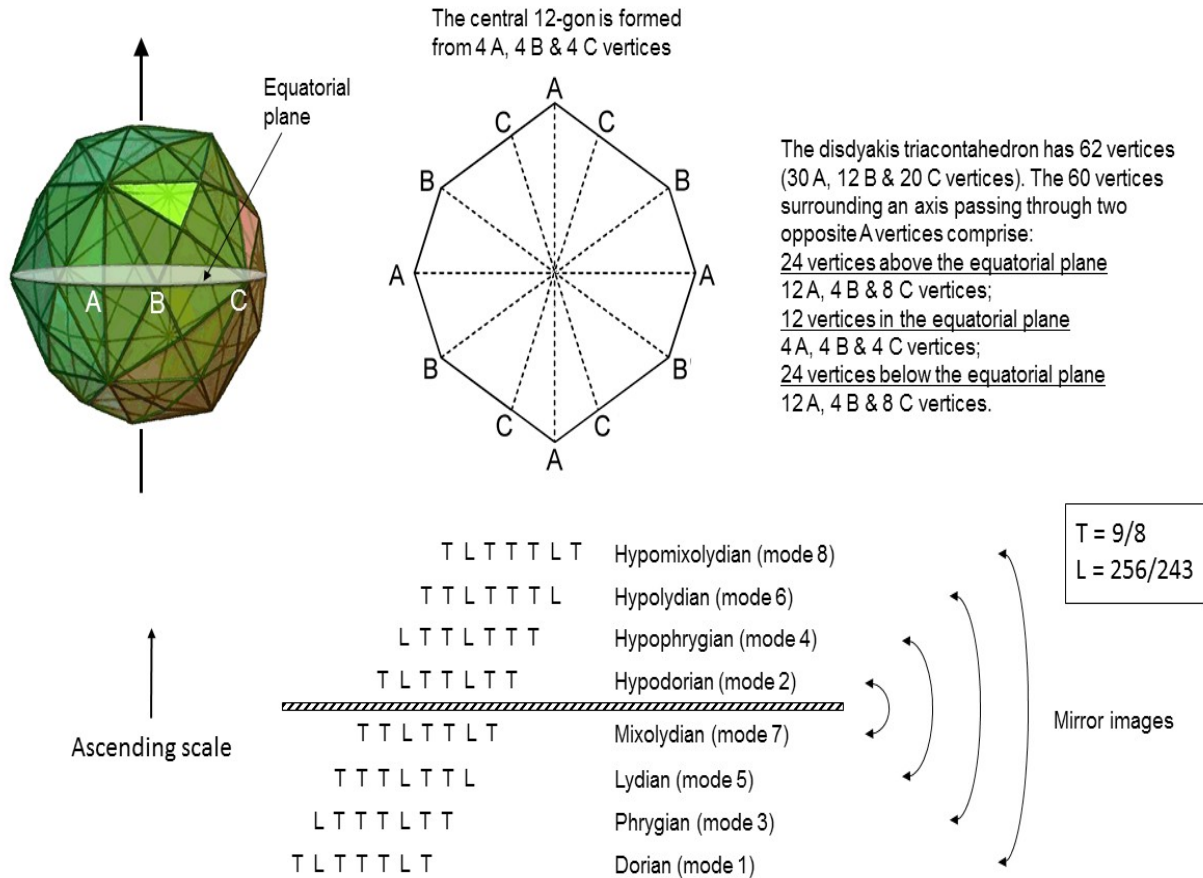
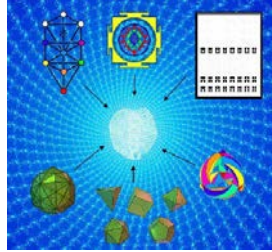
The 5 Platonic solids have **50** vertices. Forty vertices surround axes drawn through two opposite vertices, shown as black. If the 5 regular polyhedra are considered nested in one another so that their axes coincide and their sizes are adjusted so that all their uppermost vertices coincide and all their lowest vertices coincide, the nest now has 42 distinct vertices. Their upper halves have 20 blue vertices, sharing one black vertex; their lower halves have 20 red vertices and share one black vertex. The **21:21** division characteristic of holistic systems appears in the 5 Platonic solids as the **21:21** division in the 42 points in 3-d space minimally required to fit them inside one another so that only a pair of vertices in each polyhedron occupies the same two points in space.

Sri Yanta and Musical Scales



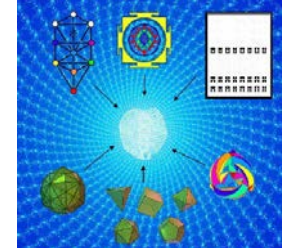
42 triangles in the Sri Yantra surround its central (white) triangle. They have **21** blue, outward-pointing tips in one half of the Sri Yantra and **21** red tips in its other half. They denote the **21** notes between the tonic and octave of the 7 diatonic scales and their **21** inversions.

Disdyakis Triacontahedron and Music



The disdyakis triacontahedron has **62** vertices. They are of three types: A ($\times 30$), B ($\times 12$) and C ($\times 20$). Considering the straight line passing through two opposite A vertices as its axis, 60 vertices (28 A, 12 B & 20 C) surround it. There are 12 vertices (4 A, 4 B & 4 C) in the equatorial plane that form the corners of a 12-gon. **48** vertices surround the axis above and below this plane. Each half has 24 vertices that comprise 12 A, 4 B & 8 C vertices. Including the vertices at the top and bottom, the **50** vertices not lying in the equatorial plane are the counterpart of both the **50** notes in the spherical representation of the 8 Church modes (see above) and the **50** corners of the first (6+6) enfolded polygons of the inner Tree of Life. They are prescribed by ELOHIM, the Godname of Binah with number value **50**. The A vertices at the top and bottom of the disdyakis triacontahedron denote the tonic and octave, whilst the 24 vertices in each half denote the 24 notes in the 8 Church musical modes and their 24 inversions.

Tree of Life and Church Modes



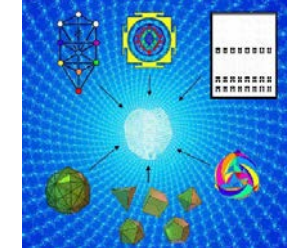
Dorian mode (D scale)

	C	D	E	F	G	A	B	C'
C	1	9/8	32/27	4/3	3/2	27/16	16/9	2
D	8/9	1	256/243	32/27	4/3	3/2	128/81	16/9
E	27/32	243/256	1	9/8	81/64	729/512	3/2	27/16
F	3/4	27/32	8/9	1	9/8	81/64	4/3	3/2
G	2/3	3/4	64/81	8/9	1	9/8	32/27	4/3
A	16/27	2/3	512/729	64/81	8/9	1	256/243	32/27
B	9/16	81/128	2/3	3/4	27/32	243/256	1	9/8
C'	1/2	9/16	16/27	2/3	3/4	27/32	8/9	1

Hypodorian mode (A scale)

	C	D	E	F	G	A	B	C'
C	1	9/8	32/27	4/3	3/2	128/81	16/9	2
D	8/9	1	256/243	32/27	4/3	1024/729	128/81	16/9
E	27/32	243/256	1	9/8	81/64	4/3	3/2	27/16
F	3/4	27/32	8/9	1	9/8	32/27	4/3	3/2
G	2/3	3/4	64/81	8/9	1	256/243	32/27	4/3
A	81/128	729/1024	3/4	27/32	243/256	1	9/8	81/64
B	9/16	81/128	2/3	3/4	27/32	8/9	1	9/8
C'	1/2	9/16	16/27	2/3	3/4	64/81	8/9	1

Tree of Life and Church Modes



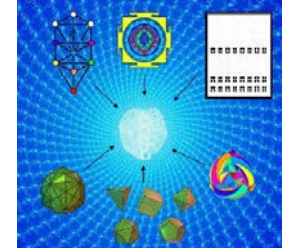
Phrygian mode (E scale)

	C	D	E	F	G	A	B	C'
C	1	256/243	32/27	4/3	3/2	128/81	16/9	2
D	243/256	1	9/8	81/64	729/512	3/2	27/16	243/128
E	27/32	8/9	1	9/8	81/64	4/3	3/2	27/16
F	3/4	64/81	8/9	1	9/8	32/27	4/3	3/2
G	2/3	512/729	64/81	8/9	1	256/243	32/27	4/3
A	81/128	2/3	3/4	27/32	243/256	1	9/8	81/64
B	9/16	16/27	2/3	3/4	27/32	8/9	1	9/8
C'	1/2	128/243	16/27	2/3	3/4	64/81	8/9	1

Hypophrygian mode (B scale)

	C	D	E	F	G	A	B	C'
C	1	256/243	32/27	4/3	1024/729	128/81	16/9	2
D	243/256	1	9/8	81/64	4/3	3/2	27/16	243/128
E	27/32	8/9	1	9/8	32/27	4/3	3/2	27/16
F	3/4	64/81	8/9	1	256/243	32/27	4/3	3/2
G	729/1024	3/4	27/32	243/256	1	9/8	81/64	729/512
A	81/128	2/3	3/4	27/32	8/9	1	9/8	81/64
B	9/16	16/27	2/3	3/4	64/81	8/9	1	9/8
C'	1/2	128/243	16/27	2/3	512/729	64/81	8/9	1

Tree of Life and Church Modes



Lydian mode (F scale)

	C	D	E	F	G	A	B	C'
C	1	9/8	81/64	729/512	3/2	27/16	243/128	2
D	8/9	1	9/8	81/64	4/3	3/2	27/16	16/9
E	64/81	8/9	1	9/8	32/27	4/3	3/2	128/81
F	512/729	64/81	8/9	1	256/243	32/27	4/3	1024/729
G	2/3	3/4	27/32	243/256	1	9/8	81/64	4/3
A	16/27	2/3	3/4	27/32	8/9	1	9/8	32/27
B	128/243	16/27	2/3	3/4	64/81	8/9	1	256/243
C'	1/2	9/16	81/128	729/1024	3/4	27/32	243/256	1

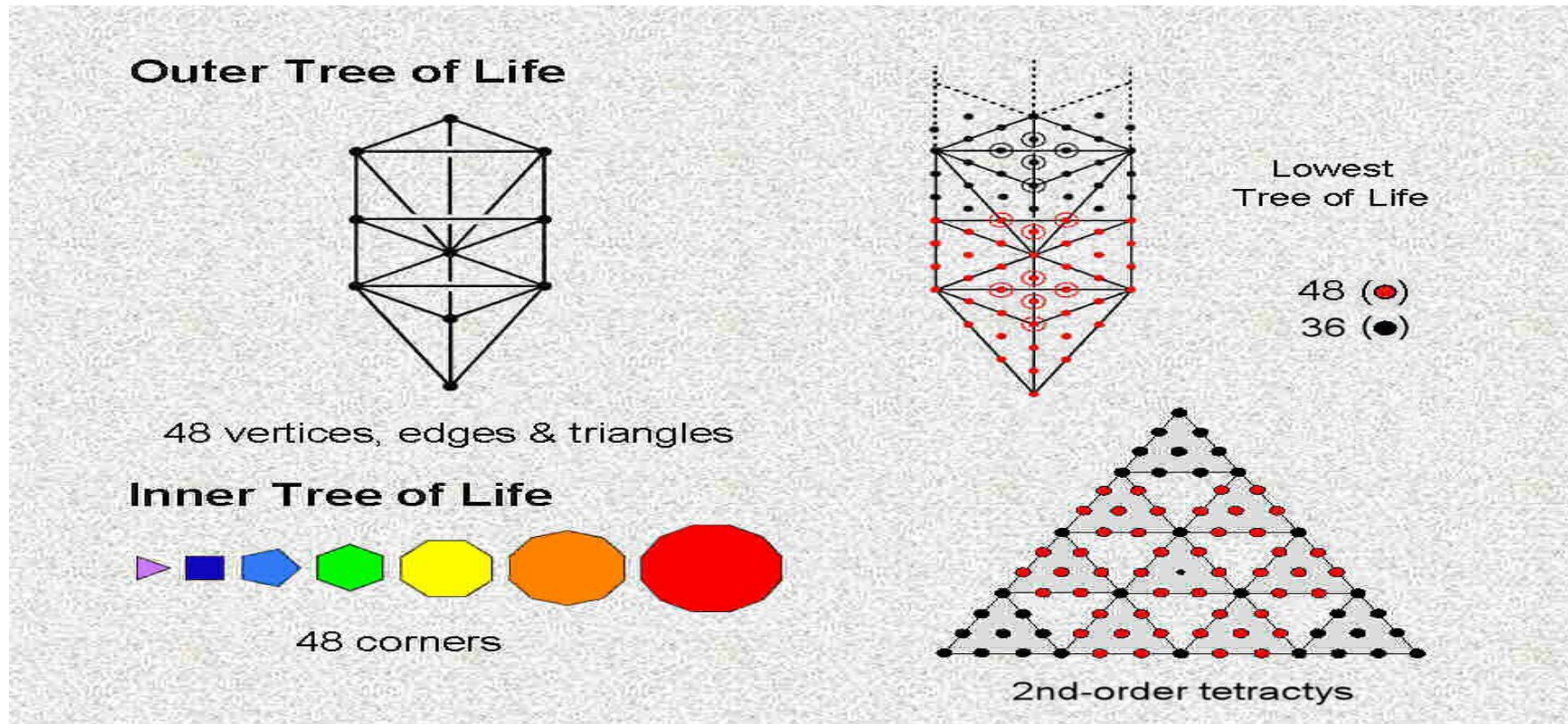
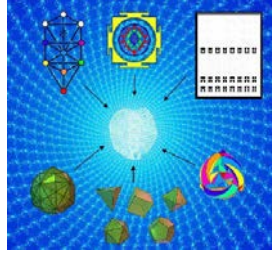
Mixolydian mode (G scale)

	C	D	E	F	G	A	B	C'
C	1	9/8	81/64	4/3	3/2	27/16	16/9	2
D	8/9	1	9/8	32/27	4/3	3/2	128/81	16/9
E	64/81	8/9	1	256/243	32/27	4/3	1024/729	128/81
F	3/4	27/32	243/256	1	9/8	81/64	4/3	3/2
G	2/3	3/4	27/32	8/9	1	9/8	32/27	4/3
A	16/27	2/3	3/4	64/81	8/9	1	256/243	32/27
B	9/16	81/128	729/1024	3/4	27/32	243/256	1	9/8
C'	1/2	9/16	81/128	2/3	3/4	27/32	8/9	1

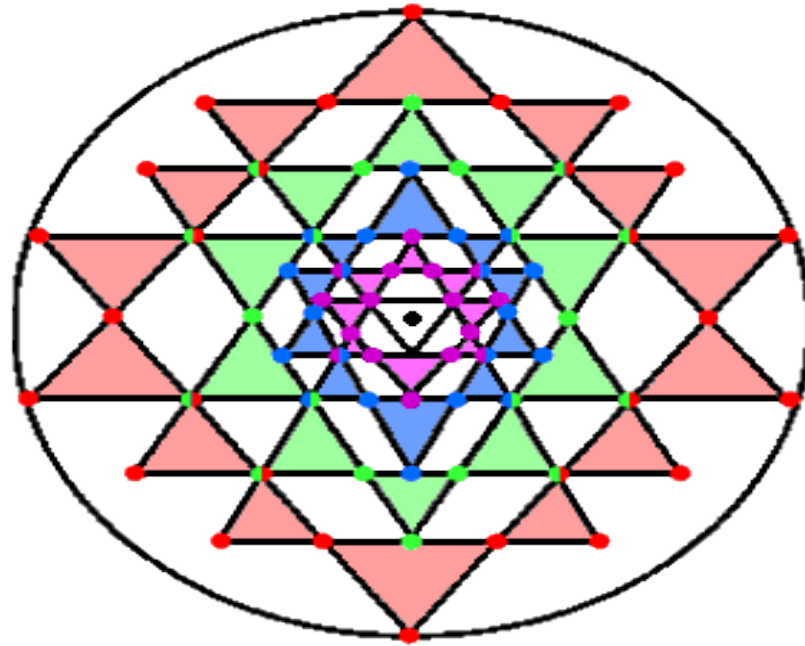
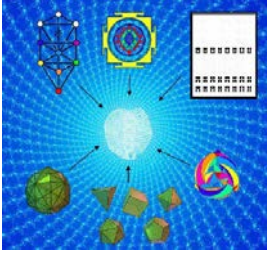
Hypolydian mode (C scale)

	C	D	E	F	G	A	B	C'
C	1	9/8	81/64	4/3	3/2	27/16	243/128	2
D	8/9	1	9/8	32/27	4/3	3/2	27/16	16/9
E	64/81	8/9	1	256/243	32/27	4/3	3/2	128/81
F	3/4	27/32	243/256	1	9/8	81/64	729/512	3/2
G	2/3	3/4	27/32	8/9	1	9/8	81/64	4/3
A	16/27	2/3	3/4	64/81	8/9	1	9/8	32/27
B	128/243	16/27	2/3	512/729	64/81	8/9	1	256/243
C'	1/2	9/16	81/128	2/3	3/4	27/32	243/256	1

Sacred Geometry Tree of Life



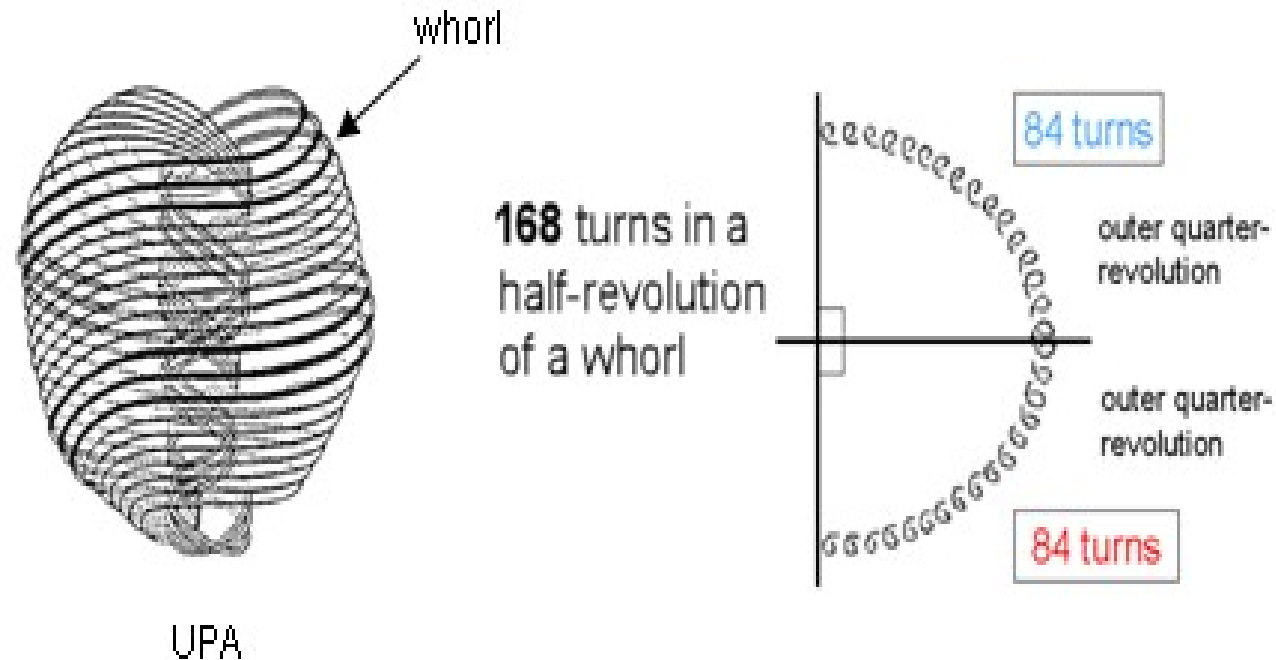
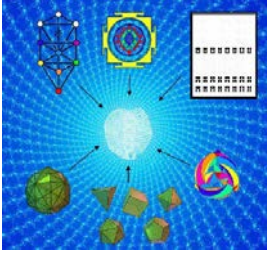
Sri Yantra and Pythagorean Intervals



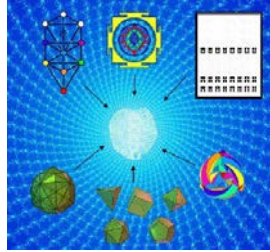
3rd & 4th layers ($\triangle/\triangle$): 48 (● & ●)

1st & 2nd layers ($\triangle/\triangle$): 36 (● & ●)

Sacred Geometry of String Subquark



Exceptional Lie Group E8 and Music



The 240 non-zero roots of the superstring gauge symmetry group E_8

The roots of the E_8 Lie algebra are described in terms of eight orthonormal unit vectors $\{u_i\}$

Eight zero roots correspond to points at the centre of the root diagram and 240 non-zero roots all have length $\sqrt{2}$. They are given by

$$\pm u_i \pm u_j \quad (i, j = 1, 2, \dots, 8)$$

and

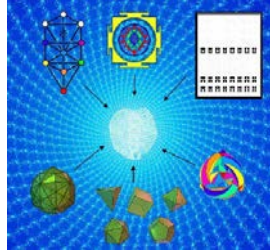
$$\frac{1}{2}(\pm u_1, \pm u_2, \dots, \pm u_8) \quad (\text{even number of } +\text{'s})$$

Their explicit forms as 8-tuples and their numbers are listed below:

$$\begin{array}{l}
 (1, 1, 0, 0, 0, 0, 0, 0) \text{ and all permutations. Number} = \binom{8}{2} = 28; \\
 (-1, -1, 0, 0, 0, 0, 0, 0) \text{ and all permutations. Number} = \binom{8}{2} = 28; \\
 (1, -1, 0, 0, 0, 0, 0, 0) \text{ and all permutations. Number} = 2 \times \binom{8}{2} = 56; \\
 (-\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}) \text{ and all permutations. Number} = \binom{8}{2} = 28; \\
 (-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}, \frac{1}{2}) \text{ and all permutations. Number} = \binom{8}{2} = 28; \\
 (-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}) \text{ and all permutations. Number} = \binom{8}{4} = 70; \\
 (\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}). \text{ Number} = 1; \\
 (-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}). \text{ Number} = 1.
 \end{array}$$

$\left. \begin{array}{l} 56 \\ 56 \end{array} \right\} 3 \times 56 = 168$
 $\left. \begin{array}{l} 168 \\ 72 \end{array} \right\} 240$

56 rising and falling D intervals
 56 rising and falling E & G intervals
 56 rising and falling F & A intervals



Six Sacred Geometries, Seven Diatonic Musical Scales and E8

The 240 non-zero roots of the superstring gauge symmetry group E_8

The roots of the E_8 Lie algebra are described in terms of eight orthonormal unit vectors $\{u_i\}$

Eight zero roots correspond to points at the centre of the root diagram and 240 non-zero roots all have length $\sqrt{2}$. They are given by

$$\pm u_i \pm u_j \quad (i, j = 1, 2, \dots, 8)$$

and

$$\frac{1}{2}(\pm u_1, \pm u_2, \dots, \pm u_8) \quad (\text{even number of '+'s})$$

Their explicit forms as 8-tuples and their numbers are listed below:

$$\begin{aligned} & (1, 1, 0, 0, 0, 0, 0, 0) \text{ and all permutations. Number} = \binom{8}{2} = 28; \\ & (-1, -1, 0, 0, 0, 0, 0, 0) \text{ and all permutations. Number} = \binom{8}{2} = 28; \\ & (1, -1, 0, 0, 0, 0, 0, 0) \text{ and all permutations. Number} = 2 \times \binom{8}{2} = 56; \\ & (-\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}) \text{ and all permutations. Number} = \binom{8}{2} = 28; \\ & (-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}) \text{ and all permutations. Number} = \binom{8}{2} = 28; \\ & (-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}) \text{ and all permutations. Number} = \binom{8}{4} = 70; \\ & (\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}). \text{ Number} = 1; \\ & (-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}). \text{ Number} = 1. \end{aligned}$$

$\left. \begin{array}{l} 168 \\ 72 \end{array} \right\} 240$

$$\underline{168 = 3 \times 56}$$

The 240 roots of the rank-8, exceptional Lie group E_8 consist of **112** roots represented by 8-tuples with integer number components and 128 roots represented by 8-tuples with half-integral components, in both cases the sum of the coordinates for each 8-dimensional root vector being even. The former comprise two sets of 28 roots and one set of 56 roots. The latter comprise two sets of 28 roots, a set of 70 roots and a root at $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2})$ and its mirror image $(\frac{1}{2} \rightarrow -\frac{1}{2})$. The **72** roots that do not form sets of 28 generate the **72** roots of the rank-6, exceptional group E_6 . The remaining **168** roots comprise four sets of 28 and one set of 56, i.e., three sets of 56.

$$\underline{168 = 2 \times 84}$$

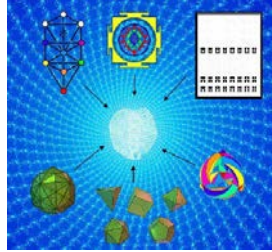
The **168** roots can be divided into three sets of 28 roots:

$(1, 1, 0, 0, 0, 0, 0, 0)$ and all 28 permutations
 $(1, -1, 0, 0, 0, 0, 0, 0)$ and all 28 combinations
 $(-\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2})$ and all 28 permutations
 and their inversions:

$(-1, -1, 0, 0, 0, 0, 0, 0)$ and all 28 permutations
 $(-1, 1, 0, 0, 0, 0, 0, 0)$ and all 28 combinations
 $(\frac{1}{2}, \frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2})$ and all 28 permutations.

The **168** roots comprise 84 roots and their 84 inversions

Six Sacred Geometries, Seven Diatonic Musical Scales and E8



In terms of the eight orthonormal unit vectors $\{u_i\}$, the 240 roots of E_8 are:

$$\pm u_i \pm u_j \quad (i, j = 1, 2, \dots, 8)$$

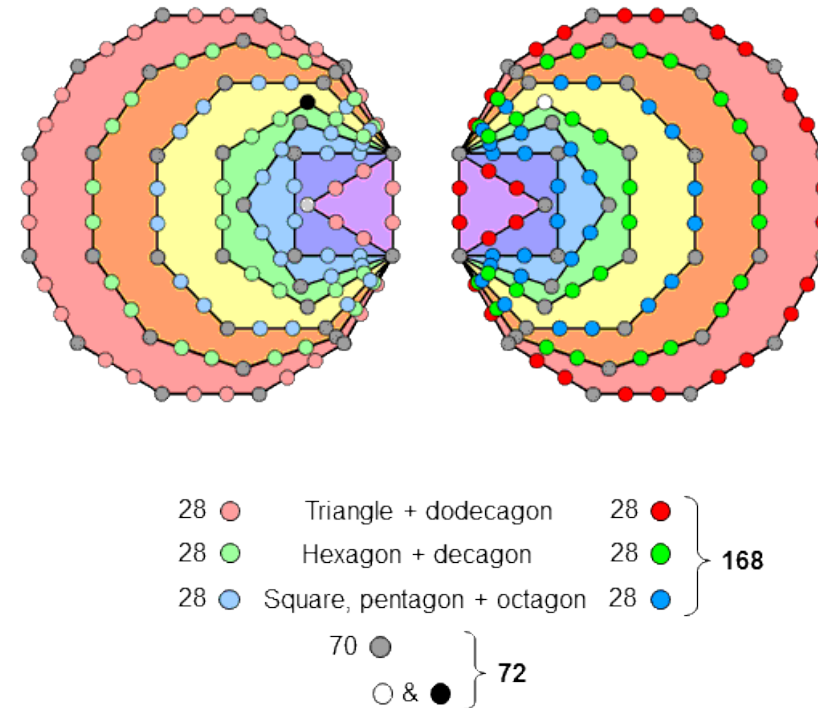
and

$$\frac{1}{2}(\pm u_1, \pm u_2, \dots, \pm u_8) \quad (\text{even number of '+'s})$$

Their explicit forms as 8-tuples and their numbers are listed below:

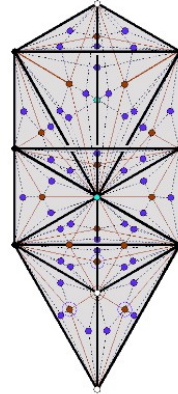
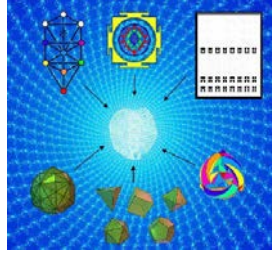
$(1, 1, 0, 0, 0, 0, 0, 0)$ and all permutations. Number = $\binom{8}{2} = 28$;
 $(-1, -1, 0, 0, 0, 0, 0, 0)$ and all permutations. Number = $\binom{8}{2} = 28$;
 $(1, -1, 0, 0, 0, 0, 0, 0)$ and all permutations. Number = $2 \times \binom{8}{2} = 56$;
 $(-\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2})$ and all permutations. Number = $\binom{8}{2} = 28$;
 $(-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$ and all permutations. Number = $\binom{8}{2} = 28$;
 $(-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2})$ and all permutations. Number = $\binom{8}{4} = 70$;
 $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2})$. Number = 1;
 $(-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2})$. Number = 1.

{ 168
 } 72

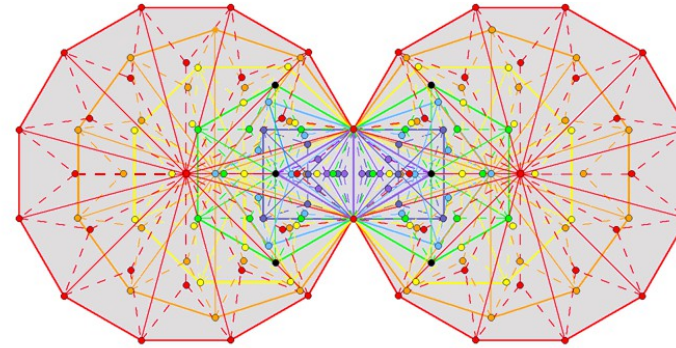


The (72+168=240) yods lining the boundaries of the two separate halves of the inner form of the Tree of Life denote the (72+168) roots of the rank-8 exceptional Lie group E_8

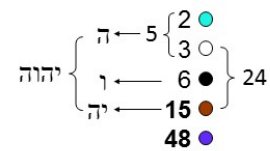
Six Sacred Geometries, Seven Diatonic Musical Scales and E8



Outer Tree of Life
with Type B triangles



Inner Tree of Life with Type B polygons



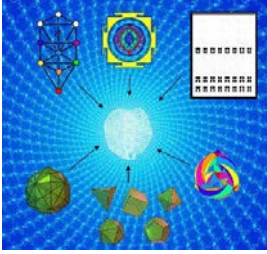
48 roots of F_4
 Total = $74 = 2 + 24 + 48 = 2 + 72 \rightarrow 72$ roots of E_6

6 ● shared with outer Tree of Life
 (84+84=168) ●, ●, ●, ●, ●, ● & ● unshared with outer Tree of Life

168 roots of E_8 that are not roots of E_6

The two ● corners forming the *root* of the outer Tree of Life, whose projection onto the plane of the polygons is their root edge, generate $(72+168=240)$ corners of triangles that are unshared by the outer and inner Trees of Life. These 240 corners correspond to the 240 roots of E_8 . The two ● corners and the six shared ● corners correspond to the eight simple roots of E_8 .

Six Sacred Geometries, Seven Diatonic Musical Scales and E8

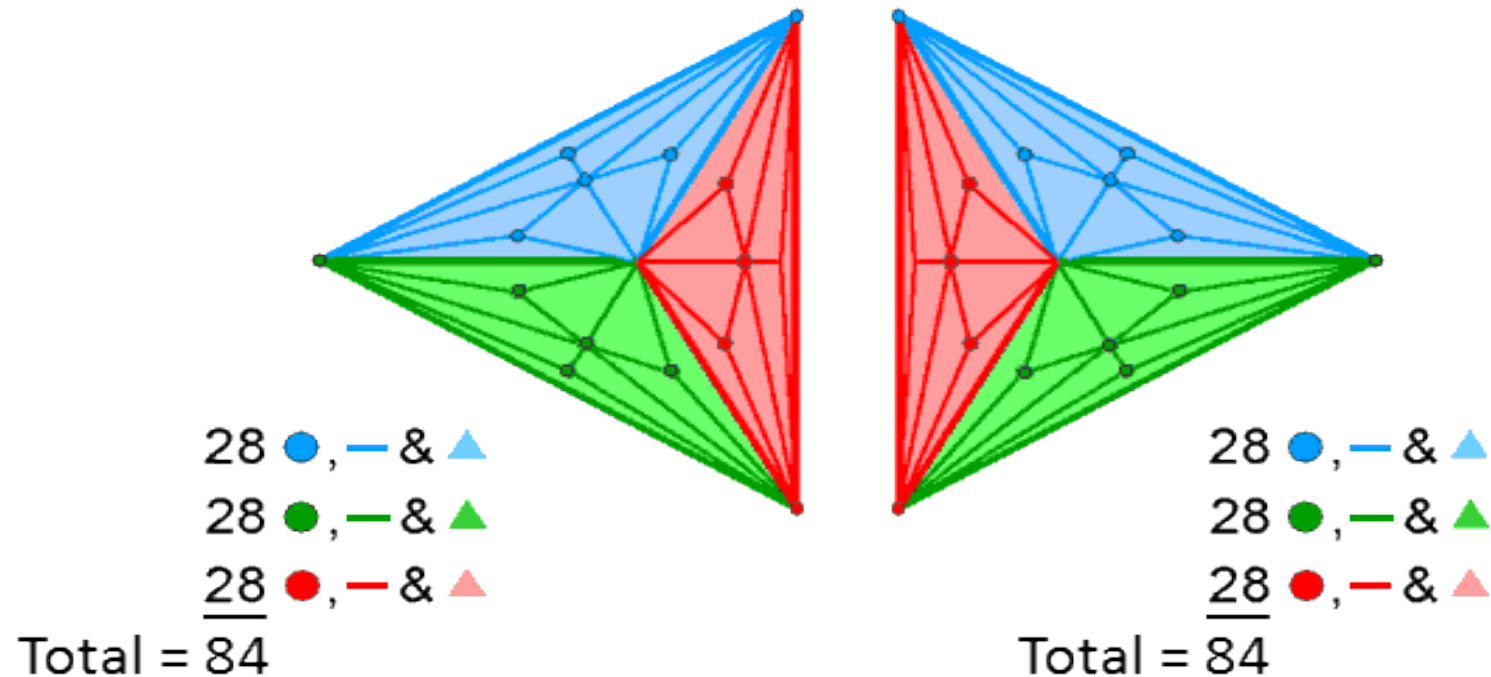
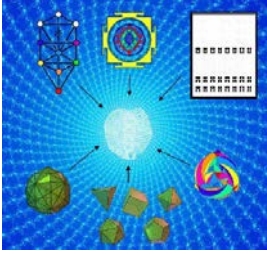


	Root edge	Triangle	Square	Pentagon	Hexagon	Octagon	Decagon	Dodecagon
Number of corners (separate)	2	7	9	11	13	17	21	25
Number of corners (enfolded)	1	4	7	9	7	15	18	23

28 56

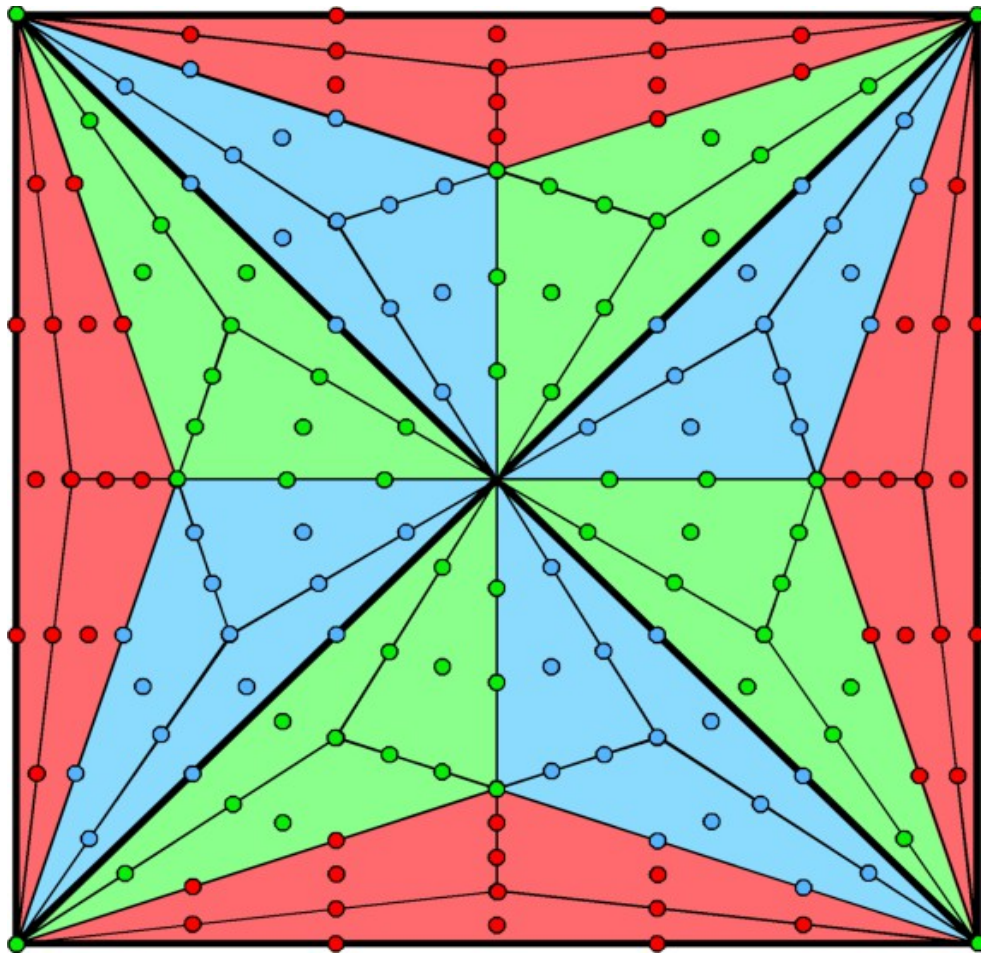
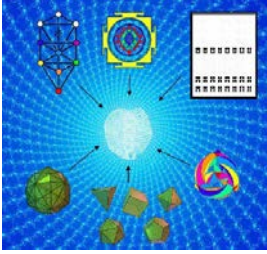
84

Six Sacred Geometries, Seven Diatonic Musical Scales and E8

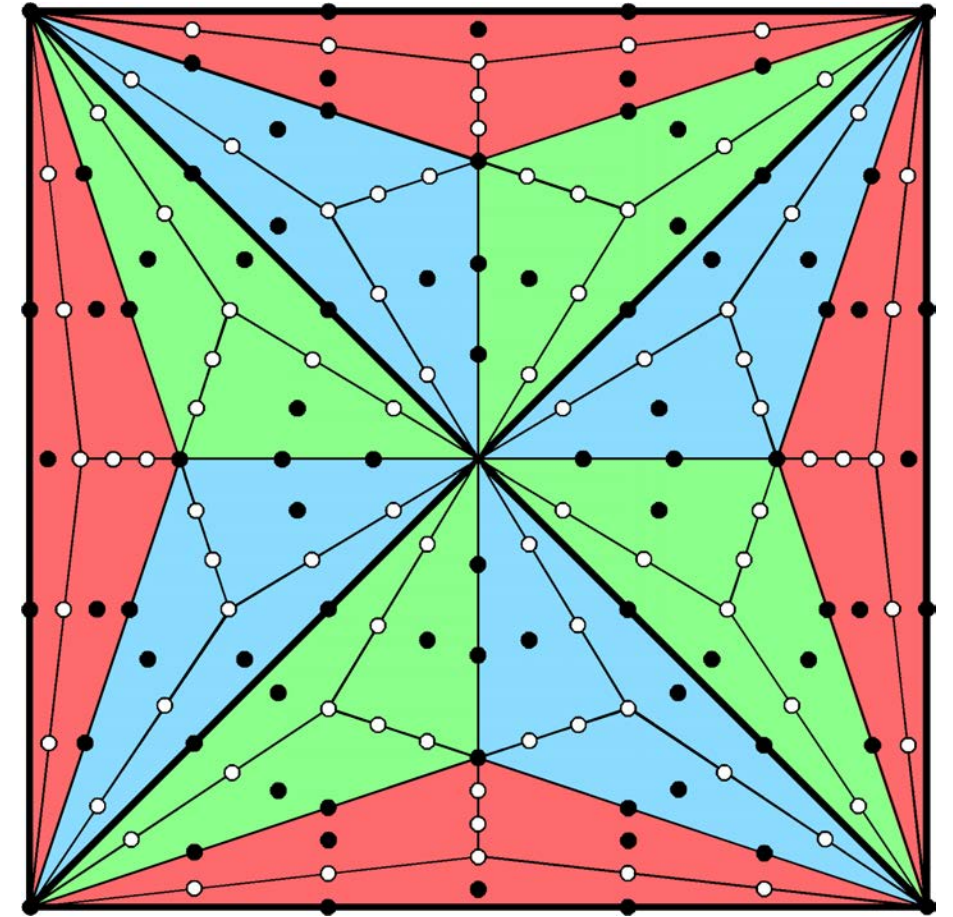


**(6×28=168) points, lines & triangles surround
the centres of two separate Type C triangles**

Six Sacred Geometries, Seven Diatonic Musical Scales and E8



56 ●
56 ●
56 ●
Total = 168

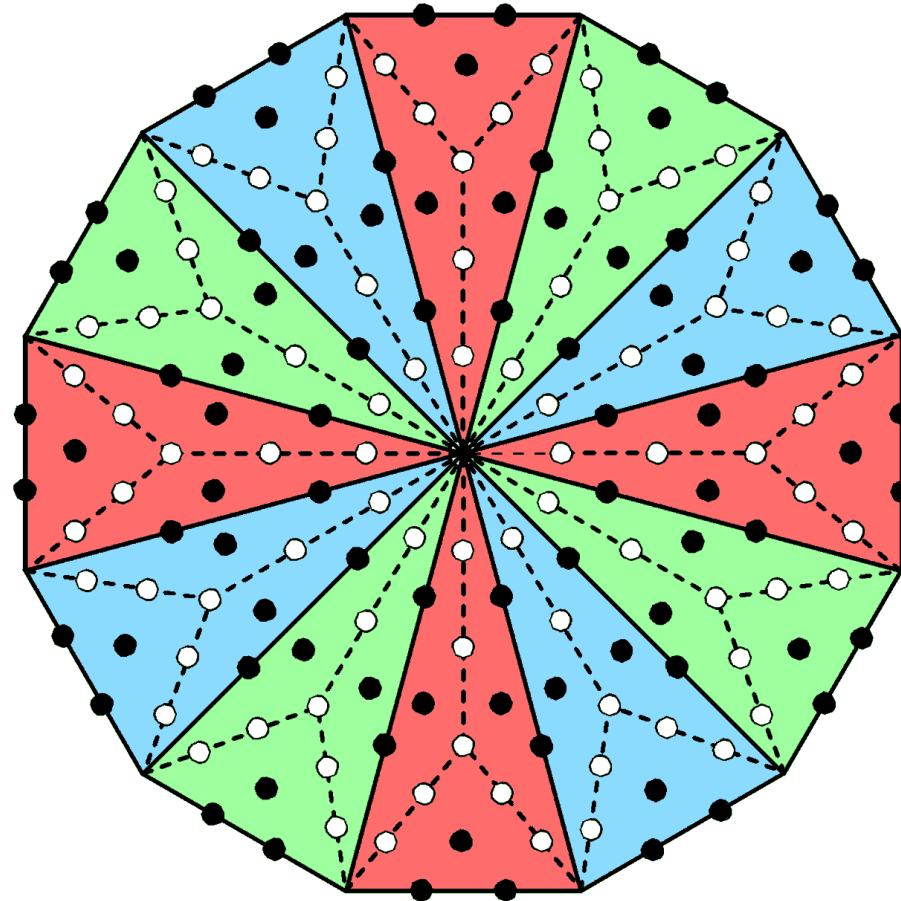
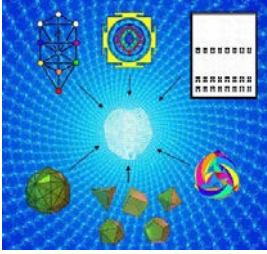


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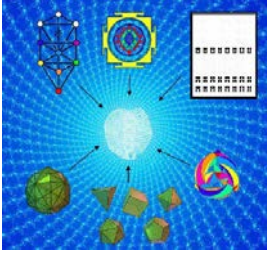
Is Mysticism Where Science, Art and
Religion Meet?

51

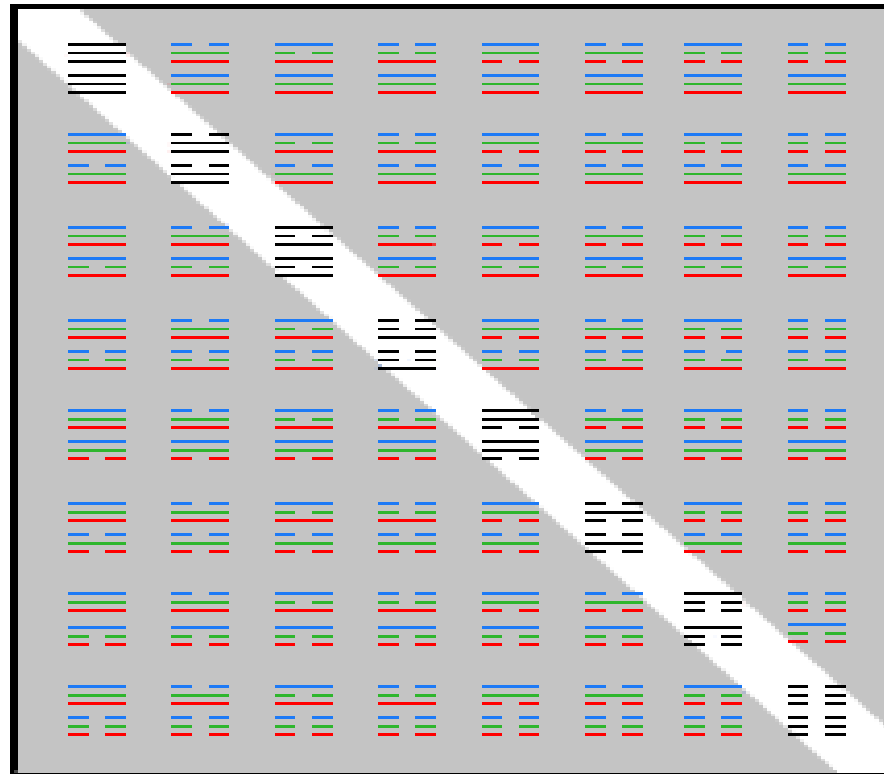
Six Sacred Geometries, Seven Diatonic Musical Scales and E8



Six Sacred Geometries, Seven Diatonic Musical Scales and E8

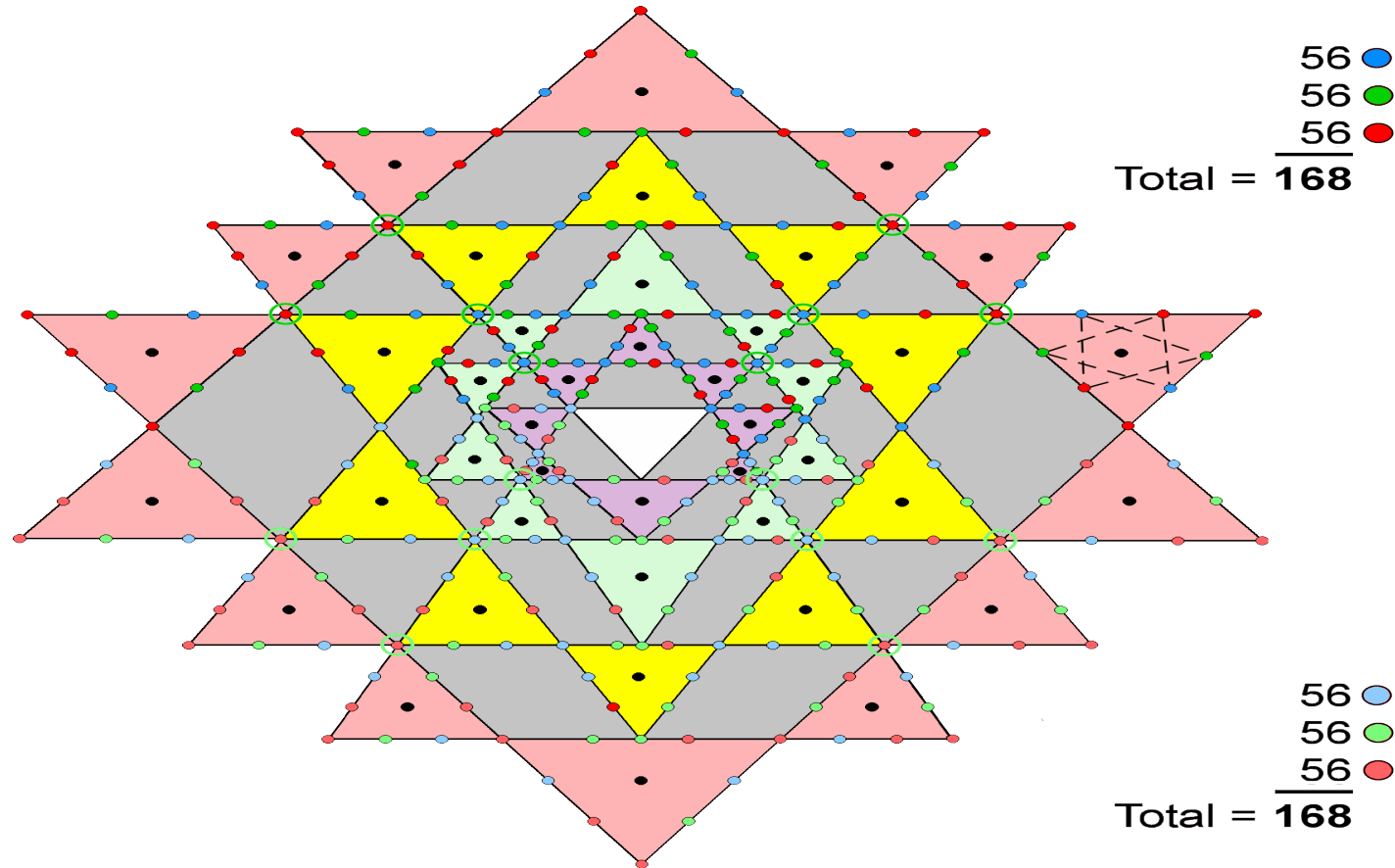
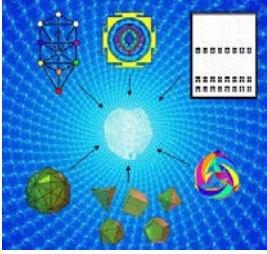


$$\begin{array}{r}
 56 \text{ ---} \& \text{---} \\
 56 \text{ ---} \& \text{---} \\
 56 \text{ ---} \& \text{---} \\
 \hline
 168
 \end{array}$$

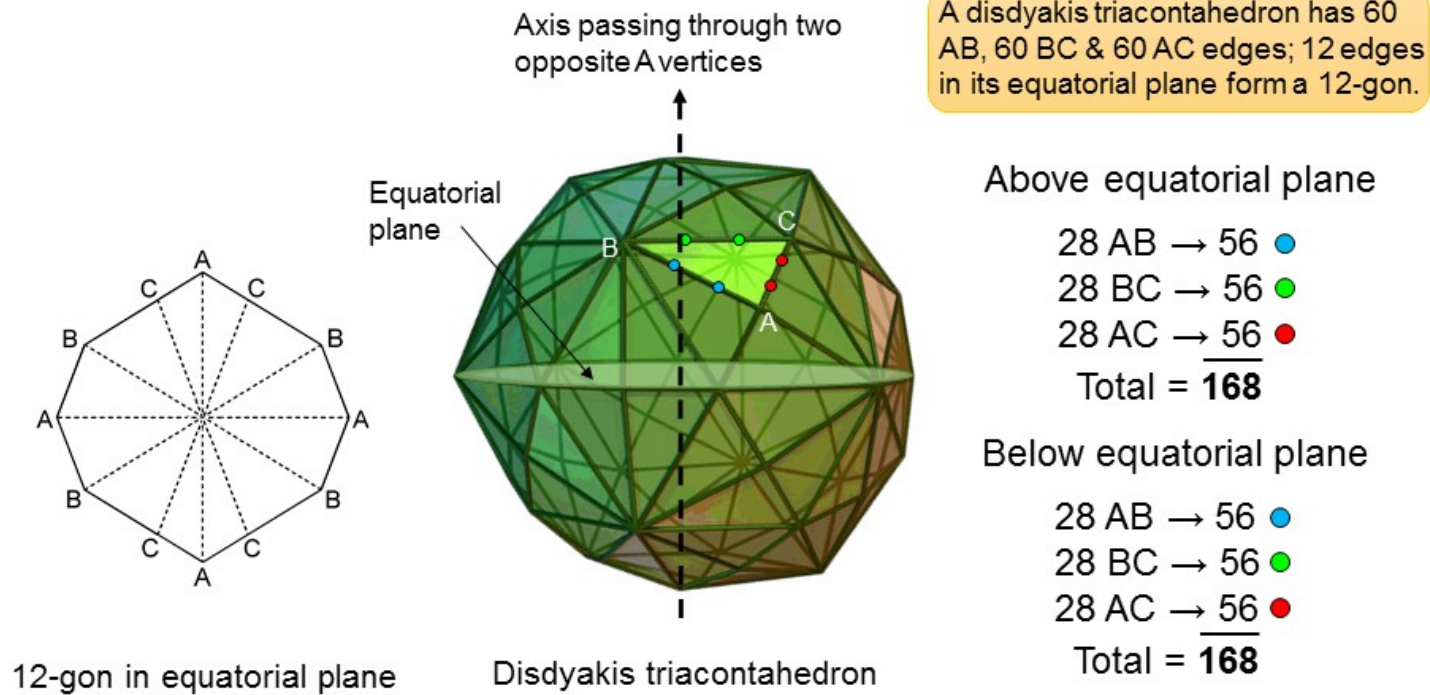
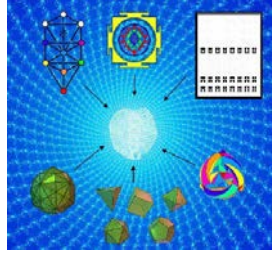


$$\begin{array}{r}
 56 \text{ ---} \& \text{---} \\
 56 \text{ ---} \& \text{---} \\
 56 \text{ ---} \& \text{---} \\
 \hline
 168
 \end{array}$$

Six Sacred Geometries, Seven Diatonic Musical Scales and E8

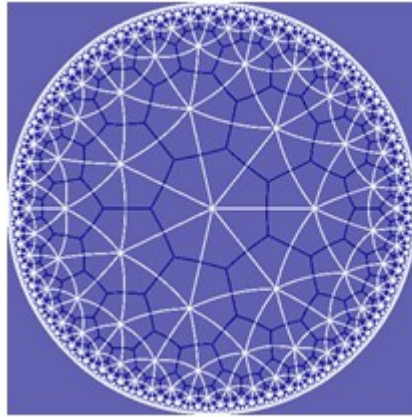
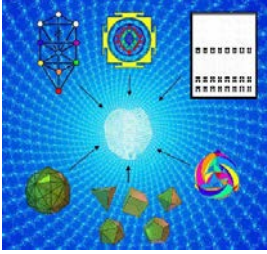


Six Sacred Geometries, Seven Diatonic Musical Scales and E8



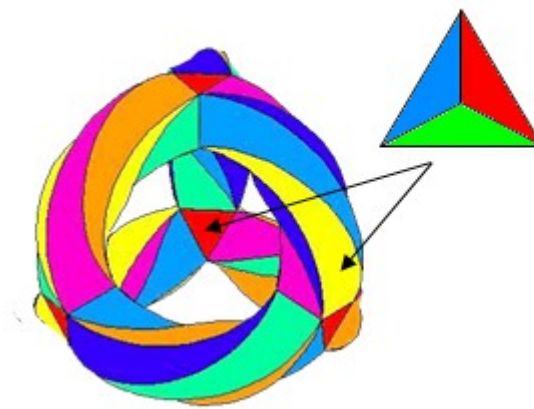
The 168 hexagonal yods on the edges of the disdyakis triacontahedron in its upper & lower halves consist of three sets of 56 yods.

Six Sacred Geometries, Seven Diatonic Musical Scales and E8



$\{3,7\}$ tiling

56 triangles with **168** vertices
are needed to tile the 3-torus



Type A
triangle

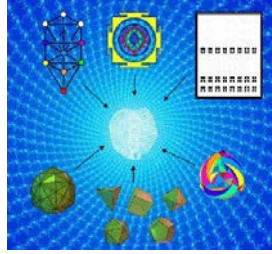
56 
56 
56 

Total = **168**

3-torus formed from 4
triangular prisms and 6
square antiprisms

**56 triangles in the $\{3,7\}$ tiling on a 3-torus of the 168
symmetries of the Kline quartic have $3 \times 56 = 168$ sectors**

Six Sacred Geometries, Seven Diatonic Musical Scales and E8



Tone Ratios of the Seven Octave Species

F scale	1	9/8	81/64	729/512	3/2	27/16	243/128	2
E scale	1	256/243	32/27	4/3	3/2	128/81	16/9	2
D scale	1	9/8	32/27	4/3	3/2	27/16	16/9	2
C scale	1	9/8	81/64	4/3	3/2	27/16	243/128	2
B scale	1	256/243	32/27	4/3	1024/729	128/81	16/9	2
A scale	1	9/8	32/27	4/3	3/2	128/81	16/9	2
G scale	1	9/8	81/64	4/3	3/2	27/16	16/9	2

(white cells denote non-Pythagorean tone ratios)

Six Sacred Geometries, Seven Diatonic Musical Scales and E8

