ARTICLE 10

How the Dodecagon Encodes the Superstring Parameters 168, 248, 336 & 1680

by

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Abstract

*The dodecagon has Pythagorean significance vis-à-vis the perfect number 10 because it is the **tenth** regular polygon. It is also the last of the seven regular polygons constituting the inner form of the Tree of Life. This article confirms the special status of the dodecagon by showing how it geometrically embodies in a natural way the numbers 168, 336 & 1680 characterising the 3-dimensional form of the superstring constituent of up and down quarks and the number 248 characterising their unified dynamics. The number values of the Godnames of the ten Sephiroth are shown to prescribe properties of a single dodecagon and a pair of joined dodecagons, thus indicating that they constitute 'sacred geometry' and must embody numbers of universal significance, such as these defining parameters of superstrings. This conclusion is confirmed by the simple and beautiful way in which the Pythagorean Tetrad expresses their properties. As the last member of the set of seven regular polygons, the dodecagon corresponds to Malkuth, the seventh and last Sephirah of Construction, because it embodies information about the 'Malkuth' or objective aspect of the microscopic manifestation of the Tree of Life in space-time. Being the polygonal counterpart of the Tree of Life, it has analogous properties, some of which will be explored in later articles. Both the yod population of the pair of joined dodecagons and the geometrical composition of the separate pair manifest the 84:84 division that characteristic of holistic systems. It is realised in the superstrings making up the quarks in atomic nuclei as the 840 circularly polarised oscillations in the outer or inner halves of each of their ten standing waves.*

Table 1. Number values of the ten Sephiroth in the four Worlds.

	SEPHIRAH	GODNAME	ARCHANGEL	ORDER OF ANGELS	MUNDANE CHAKRA
1	Kether (Crown) **620**	EHYEH (I am) **21**	Metatron (Angel of the Presence) **314**	Chaioth ha Qadesh (Holy Living Creatures) **833**	Rashith ha Gilgalim First Swirlings. (Primum Mobile) **636**
2	Chokmah (Wisdom) **73**	YAHVEH, YAH (The Lord) **26**, **15**	Raziel (Herald of the Deity) **248**	Auphanim (Wheels) **187**	Masloth (The Sphere of the Zodiac) **140**
3	Binah (Understanding) **67**	ELOHIM (God in multiplicity) **50**	Tzaphkiel (Contemplation of God) **311**	Aralim (Thrones) **282**	Shabathai Rest. (Saturn) **317**
	Daath (Knowledge) **474**				
4	Chesed (Mercy) **72**	EL (God) **31**	Tzadkiel (Benevolence of God) **62**	Chasmalim (Shining Ones) **428**	Tzadekh Righteousness. (Jupiter) **194**
5	Geburah (Severity) **216**	ELOHA (The Almighty) **36**	Samael (Severity of God) **131**	Seraphim (Fiery Serpents) **630**	Madim Vehement Strength. (Mars) **95**
6	Tiphareth (Beauty) **1081**	YAHVEH ELOHIM (God the Creator) **76**	Michael (Like unto God) **101**	Malachim (Kings) **140**	Shemesh The Solar Light. (Sun) **640**
7	Netzach (Victory) **148**	YAHVEH SABAOTH (Lord of Hosts) **129**	Haniel (Grace of God) **97**	Tarshishim or Elohim **1260**	Nogah Glittering Splendour. (Venus) **64**
8	Hod (Glory) **15**	ELOHIM SABAOTH (God of Hosts) **153**	Raphael (Divine Physician) **311**	Beni Elohim (Sons of God) **112**	Kokab The Stellar Light. (Mercury) **48**
9	Yesod (Foundation) **80**	SHADDAI EL CHAI (Almighty Living God) **49**, **363**	Gabriel (Strong Man of God) **246**	Cherubim (The Strong) **272**	Levanah The Lunar Flame. (Moon) **87**
10	Malkuth (Kingdom) **496**	ADONAI MELEKH (The Lord and King) **65**, **155**	Sandalphon (Manifest Messiah) **280**	Ashim (Souls of Fire) **351**	Cholem Yesodoth The Breaker of the Foundations. The Elements. (Earth) **168**

The Sephiroth exist in the four Worlds of Atziluth, Beriah, Yetzirah and Assiyah. Corresponding to them are the Godnames, Archangels, Order of Angels and Mundane Chakras (their physical manifestation). This table gives their number values obtained by the ancient practice of gematria, wherein a number is assigned to each letter of the alphabet, thereby giving a number value to a word that is the sum of the numbers of its letters.

1. Introduction

In earlier articles, analysis of the sacred geometry of the Tree of Life uncovered properties quantified by numbers that are the gematria number values of the ten Sephiroth, their Godnames, Archangels, Orders of
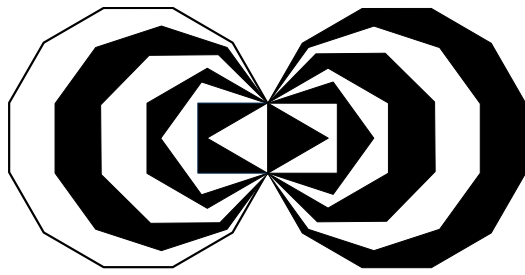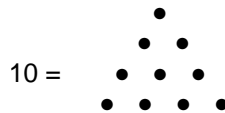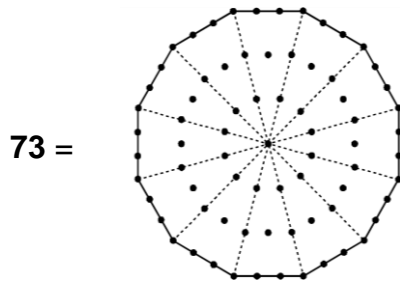

Figure 1. The inner Tree of Life.

Angels & Mundane Chakras (Table 1). It was shown in Article 9 (1) that the square embodies the structural parameter **168**[1] and the dynamical parameter **248** of the superstring constituent of up and down quarks (the latter embodiment was also discussed in Article 1 (2)). Although the relevance of these numbers to the physics of the universe was, of course, unknown to the early Pythagoreans, it illustrates in a remarkable way their profound intuition about the fundamental importance of the number 4 to the study of the natural world. This principle, which the author has called the "Tetrad Principle," was formally postulated in Article 1. But the number 10 was also central to Pythagorean mathematics because it was symbolised as the *fourth* triangular number by the tetractys:
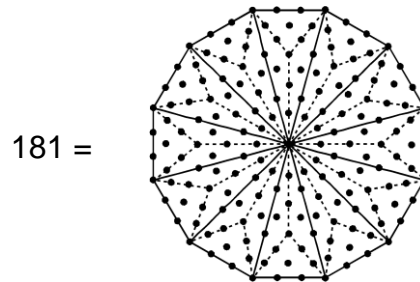
$$10 = \quad \begin{matrix} \bullet \\ \bullet \ \bullet \\ \bullet \ \bullet \ \bullet \\ \bullet \ \bullet \ \bullet \ \bullet \end{matrix}$$

The dots will be called "yods," after the name (yod) of the tenth letter (י) of the Hebrew alphabet, which is somewhat shaped like a dot or point. The inner form of the Tree of Life (Fig. 1) comprises seven enfolded, regular polygons: triangle, square, pentagon, hexagon, octagon, decagon & dodecagon. The last of these is the *tenth* regular polygon, counting from the simplest one — the triangle. Given the titles "All Perfect,"

73 =

Figure 2. The Type A dodecagon has **73** yods.

181 =

Figure 3. The Type B dodecagon has 181 yods.

"God," & "Kosmos" given by the Pythagoreans to the number 10, which they regarded as the perfect completion of number, it should come as no surprise that the dodecagon, too, embodies numbers of universal (and therefore scientific) significance. This article discusses how the dodecagon encodes the numbers **168**, **248**, 336 and 1680 as parameters of the structure and dynamics of superstrings. Of these numbers, only the second — the dimension of the rank-8, exceptional Lie group E_8 used in superstring theory — has as yet been recognised by particle physics. According to Table 1, it is the number value of *Raziel*, the Archangel of Chokmah.

2. Properties of the dodecagon

With its 12 sectors turned into 12 tetractyses, the dodecagon is made up of **73** yods (Fig. 2), of which **36** yods are on the boundary and **72** yods surround its centre. **73** is the number value of Chokmah, the second member of the Supernal Triad at the head of the Tree of Life, **36** is the Godname number of Geburah, the fifth Sephirah from the top, and **72** is the number value of Chesed, the fourth Sephirah from the top (see Table 2 below). The fact that a Godname — ELOHA — prescribes the *shape* of the dodecagon by quantifying how many yods are needed to mark out its boundary is the first sign that the dodecagon constitutes 'sacred geometry.' A dodecagon whose sectors are triangles or tetractyses (Fig. 2) will be called 'Type A.' A dodecagon whose sectors are divided into three triangles or tetractyses (Fig. 3) will be called 'Type B.' This type contains 181 yods (3). Corresponding nomenclature will apply to all other polygons.

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[1] All numbers belonging to this table will be written in boldface.

Rather than give tedious calculations, the properties of both types of dodecagon are listed below for later discussion. For the sake of reference, the number values of the Sephirothic titles, their Godnames, Archangelic Names, Angelic Names and Mundane Chakras are shown in the following table. Numbers in coloured cells either have been already referred to or will appear in later discussion.

Table 2. Gematria number values.

Sephirah	Title	Godname	Archangel	Order of Angels	Mundane Chakra
Kether	620	21	314	833	636
Chokmah	73	15, 26	248	187	140
Binah	67	50	311	282	317
Chesed	72	31	62	428	194
Geburah	216	36	131	630	95
Tiphareth	1081	76	101	140	640
Netzach	148	129	97	1260	64
Hod	15	153	311	112	48
Yesod	80	49	246	272	87
Malkuth	496	65, 155	280	351	168

Properties of: dodecagon; two separate dodecagons; joined dodecagons (4)
(Non-bracketed numbers refer to the Type A dodecagon; bracketed numbers refer to the Type B dodecagon)
1. Number of corners of dodecagon = 12 (12); 24 (24); 22 (22).
2. Number of sides of dodecagon = 12 (12); 24 (24); 23 (23).
3. Number of corners & sides of dodecagon = 24 (24); **48** (**48**); 45 (45).
4. Number of triangles = 12 (**36**); 24 (**72**); 24 (**72**).
5. Number of corners of triangles = 13 (25); **26** (**50**); 24 (**48**).
6. Number of sides of triangles = 24 (60); **48** (120); 47 (119).
7. Number of corners & sides of triangles = 37 (85); 74 (170); 71 (167).
8. Number of sides & triangles = **36** (96); **72** (192); 71 (191).
9. Number of corners & triangles = 25 (61); **50** (122); **48** (120).
10. Number of corners, sides & triangles = **49** (121); 98 (242); **95** (239).
11. Number of corners, sides & triangles outside root edge = 46 (118); **95** (239); 92 (236).
12. Number of yods = **73** (181), 146 (362), 142 (358). Number of yods other than centres = **72** (180); 144 (360); **140** (356).
13. Number of yods outside root edge = 69 (177); 138 (354); 138 (354).
14. Number of hexagonal yods = 60 (156); 120 (312); 118 (310).
15. Number of hexagonal yods outside root edge = 58 (154); 116 (308); 116 (308).
16. Number of yods on boundaries of dodecagon = **36** (**36**); **72** (**72**); 68 (68). Number of boundary yods outside root edge = 32 (32); 68 (68); **64** (**64**).
17. Number of internal yods = 37 (145); 74 (290); 74 (290).
18. Number of yods on sides of tetractyses = 61 (145); 122 (290); 118 (286). Number of yods on sides of tetractyses outside root edge = 57 (141); 118 (286); 114 (**282**).
19. Number of yods on sides of tetractyses other than corners & centre of dodecagon = **48** (132); 96 (264); 94 (262). Number of such yods outside root edge = 46 (130); 92 (260); 92 (260).
20. Number of yods other than corners & centre of dodecagon = 60 (**168**); 120 (336); 118 (334).
21. Number of yods other than corners of dodecagon & centres of its sectors = **49** (157); 98 (314); 96 (312). Number of such yods outside root edge = 47 (**155**); 94 (310); 94 (310).
22. Number of yods other than corners of dodecagon = 61 (169); 122 (338); 120 (336).

Set out below are the ways in which the Godname numbers prescribe these properties of the dodecagon and two separate or joined dodecagons:

Kether: **21**   **21** corners & sides of dodecagon outside the root edge. The Type A dodecagon has **73** yods, where **73** = **21**st prime number. Also, there are 121 corners, sides & triangles in the Type B dodecagon, where

$$121 = 11^2 = 1 + 3 + 5 + \ldots + \mathbf{21}$$

is the sum of the first ten odd integers after 1. The Pythagorean measure of perfection — the number 10 — therefore defines the geometrical composition of the *tenth* regular polygon. The Decad determines not only the number value **73** of Chokmah but also the
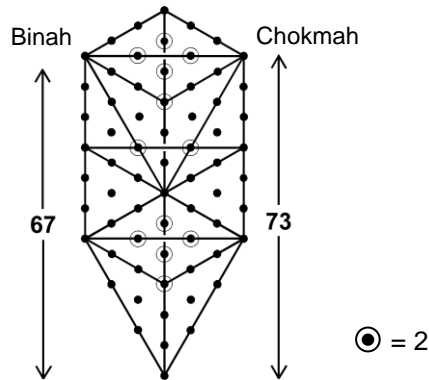

Figure 4. The number value **67** of Binah is the number of yods below it in the lowest Tree of Life. The number value **73** of Chokmah is the number of yods up to the Chokmah-Binah Path.

number value **67** of Binah because the tenth integer after 1 is 11 and an undecagon constructed from tetractyses has **67** yods. These two number values have a remarkable connection to the geometry of what was called in earlier articles the "1-tree." An n-tree (n an integer) is defined as the n lowest trees of any set of N overlapping Trees of Life (n<N). Below Binah in the 1-tree constructed from 19 tetractyses are **67** yods (Fig. 4). There are **73** yods up to the Path joining Binah and Chokmah. Far from being arbitrary appellations, the Kabbalistic titles of the Sephiroth have a geometrical basis vis-à-vis the Tree of Life and any equivalent geometrical object that embodies the divine, mathematical paradigm.

Chokmah: **15**   47 sides of Type A dodecagon, where 47 = **15**th prime number. This is the number of sectors of the seven enfolded polygons of the inner Tree of Life (Fig. 1).

26   Two separate, Type A dodecagons have 24 sectors with **26** corners. Also, number of yods outside the root edge on sides of **72** tetractyses in two joined, Type B dodecagons which are not corners or centres of dodecagons = 260 = **26**×10.

Binah: **50**   Two separate, Type B dodecagons have **72** triangles with **50** corners.

Chesed: **31**   Number of hexagonal yods in two joined, Type B dodecagons = 310 = **31**×10. This is also the number of yods outside the root edge of two joined, Type B dodecagons other than the corners and centres of their sectors.

Geburah: **36**   Number of yods on boundary of dodecagon. Also, **36** is the number of triangles in the Type B dodecagon.

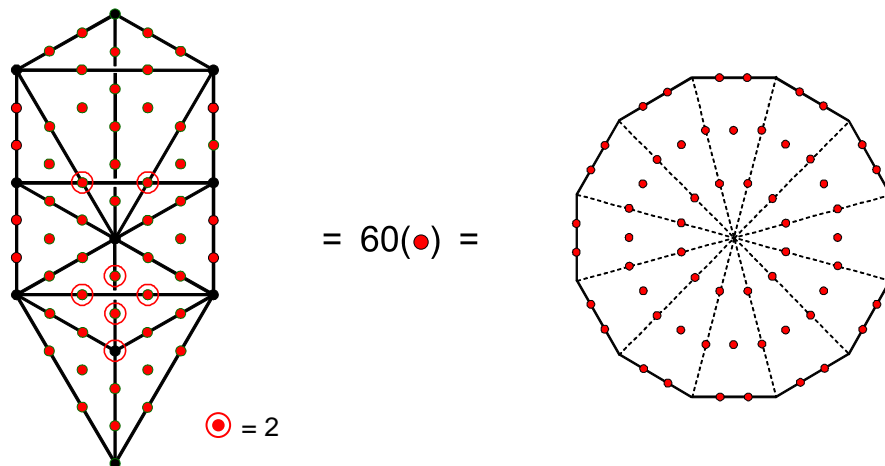Tiphareth: **76**   Number of hexagonal yods outside root edge of Type B dodecagon = 154 = 77th even

Figure 5. The Tree of Life has as many yods generated by its construction from 16 tetractyses as the Type A dodecagon has yods.

5

integer. 77 = **76**th integer after 1.

Netzach: **129**   Number of yods outside root edge on sides of **36** tetractyses other than corners or centre of Type B dodecagon = 130 = **129**th integer after 1.

Hod: **153**   Number of hexagonal yods outside root edge of Type B dodecagon = 154 = **153**rd integer after 1.

Yesod: **49**   Number of corners, sides & triangles of Type A dodecagon = **49**.

Malkuth: **65**   Number of yods outside root edge on sides of tetractyses other than corners and centre of Type B dodecagon = 130 = **65**th even integer.

155   **155** hexagonal yods associated with each joined, Type B dodecagon. Also, the number of yods outside the root edge of the Type B dodecagon other than its corners and centres of its sectors.

3. Encoding of superstring structural parameter 168

The Type A dodecagon has 60 yods other than corners surrounding its centre (Fig. 5), whilst the Type B dodecagon has **168** yods other than corners surrounding its centre (Fig. 6). In other words, **168** new yods are needed to transform its sectors into tetractyses. Compare this with what was found for the square in Article 9 (5): the Type B square with three tetractyses as each sector has 60 yods surrounding its centre,
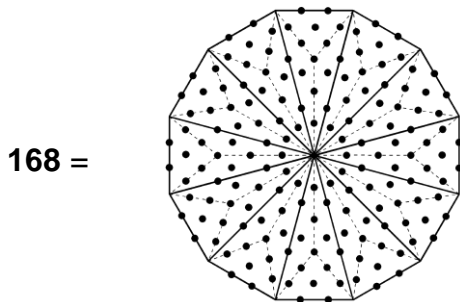
168 =

Figure 6. **168** yods other than corners surround the centre of a Type B dodecagon.

whilst the Type C square with nine tetractyses as each sector has **168** yods surrounding its centre. Polygons of Type A, B, C, etc represent successive levels of complexity in their construction from tetractyses. What is so remarkable and significant in the context of the special emphasis given by the Pythagoreans to the Decad and to the Tetrad symbolised by the square is that both the square and the tenth regular polygon embody the *same* pair of numbers, although differently. **168** is just the number of extra yods required to turn the twelve sectors of a dodecagon into tetractyses. In the case of the outer form of the Tree of Life, there are 60 extra yods needed to construct it from tetractyses. The dodecagon bears to the first six polygons the same relation as Malkuth bears to the six higher Sephiroth of Construction. This is suggested by the fact that it contains as many hexagonal yods as the Tree of Life —

only its skeletal (Malkuth) boundary is different. It is confirmed by the fact that there are **155** hexagonal yods associated with each of the two joined, Type B dodecagons (Fig. 7), whilst it has **168** yods other than corners of its sectors, where **155** is the number value of ADONAI MELEKH, the Godname of *Malkuth*, and
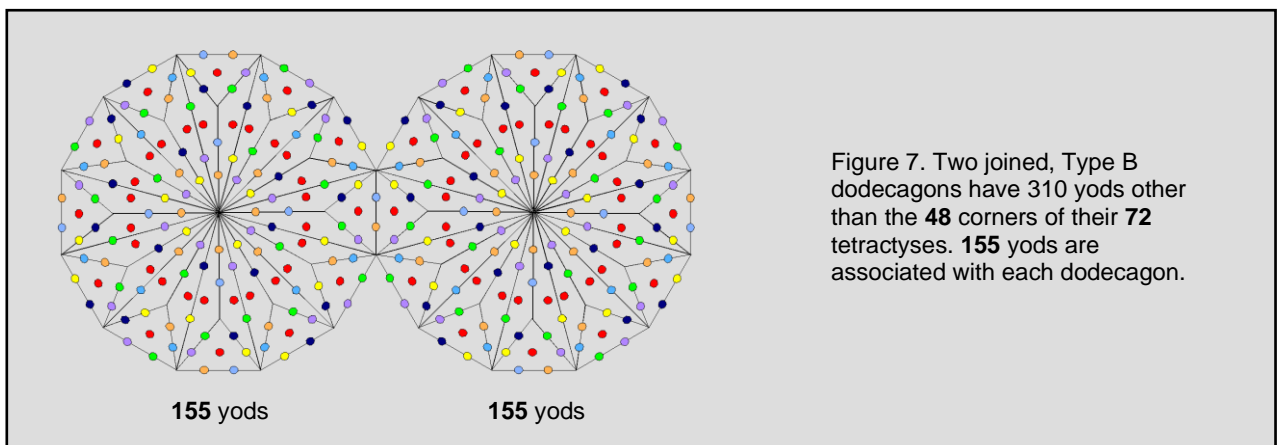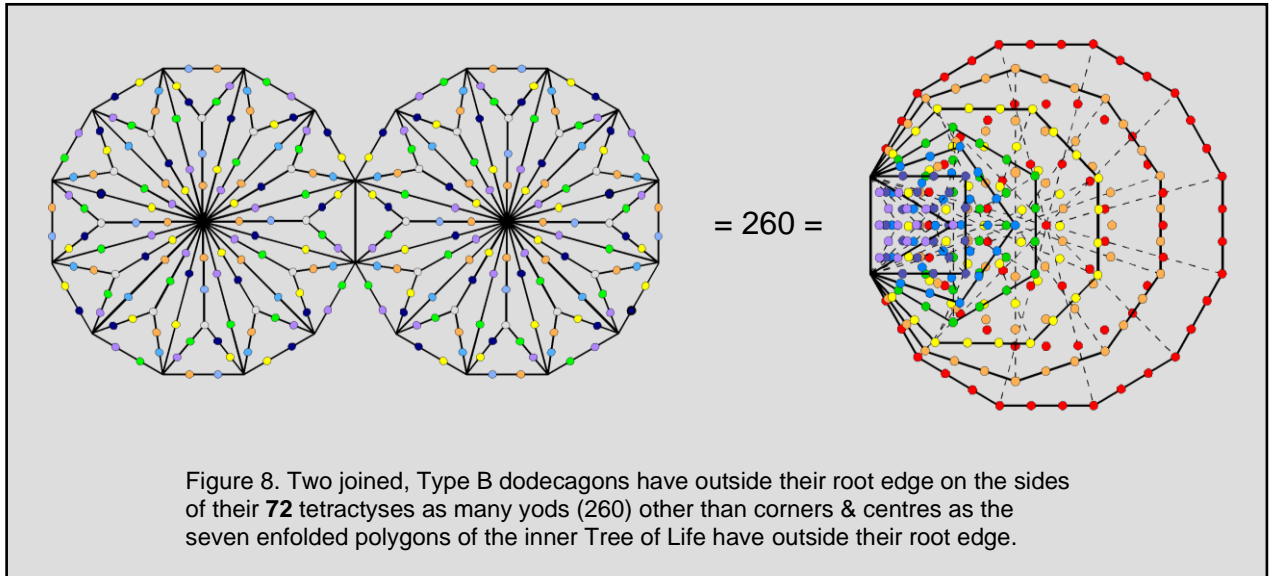

Figure 7. Two joined, Type B dodecagons have 310 yods other than the **48** corners of their **72** tetractyses. **155** yods are associated with each dodecagon.

155 yods   **155** yods

168 is the number value of *Cholem Yesodoth*, the Mundane Chakra of this Sephirah. EL, the Godname of Chesed, prescribes the pair of joined dodecagons because they contain (**155**+**155**=310=**31**×10) hexagonal yods, where **31** is its number value.

Further remarkable confirmation that the dodecagon constitutes sacred geometry because its properties are prescribed by Godnames is the fact that, outside their root edge, the two joined, Type B dodecagons
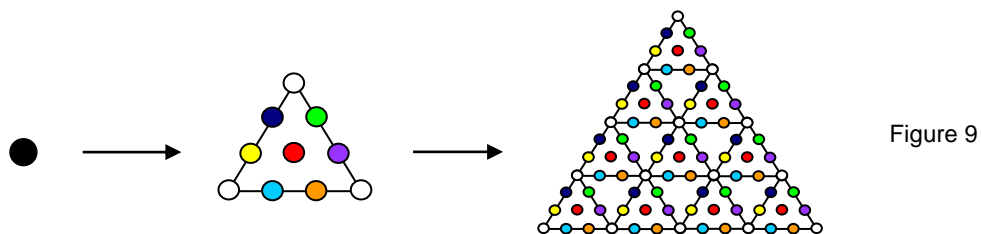
contain 260 (=**26**×10) yods on the sides of their **72** tetractyses that are not their **48** corners or centres, where **26** is the number value of YAHWEH, the Godname of Chokmah. Compare this with the fact that the seven enfolded, regular polygons contain 260 yods outside their shared root edge (Fig. 8). In the first case, this number is that needed to delineate the edges of their tetractyses outside the root edge, given their corners and centres; in the second case, it is the number of yods required to construct the seven enfolded polygons, starting with the root edge. The ways in which the generative Godname YAHWEH prescribes

= 260 =

Figure 8. Two joined, Type B dodecagons have outside their root edge on the sides of their **72** tetractyses as many yods (260) other than corners & centres as the seven enfolded polygons of the inner Tree of Life have outside their root edge.

both geometrical objects are analogous. It is not coincidental that the two objects possess properties that are quantified by the same sets of numbers listed in Table 2. The dodecagon is the polygonal form of the Tree of Life and will — like any other holistic structure — embody the numbers listed in this table.

4. Encoding of 1680 in pair of joined dodecagons

It was shown in Article 9 that, when the yods in a square constructed from tetractyses are themselves replaced by tetractyses (Fig. 9), there result **248** yods other than corners of tetractyses, that is, yods symbolising the seven Sephiroth of Construction. These symbolise the **248** quantum states of the particle transmitting the unified superstring force described by the gauge symmetry group E_8. A dodecagon with its

Figure 9

12 sectors turned into such higher-order tetractyses contains 120 tetractyses, where

$$120 = \begin{array}{cc} 2^2 & 4^2 \\ \square \\ 8^2 & 6^2 \end{array} = \begin{array}{c} 3 \\ 5 \quad 7 \\ 9 \quad 11 \quad 13 \\ 15 \quad 17 \quad 19 \quad \mathbf{21}, \end{array}$$

showing how the Tetrad determines this number. The number of yods in each sector is

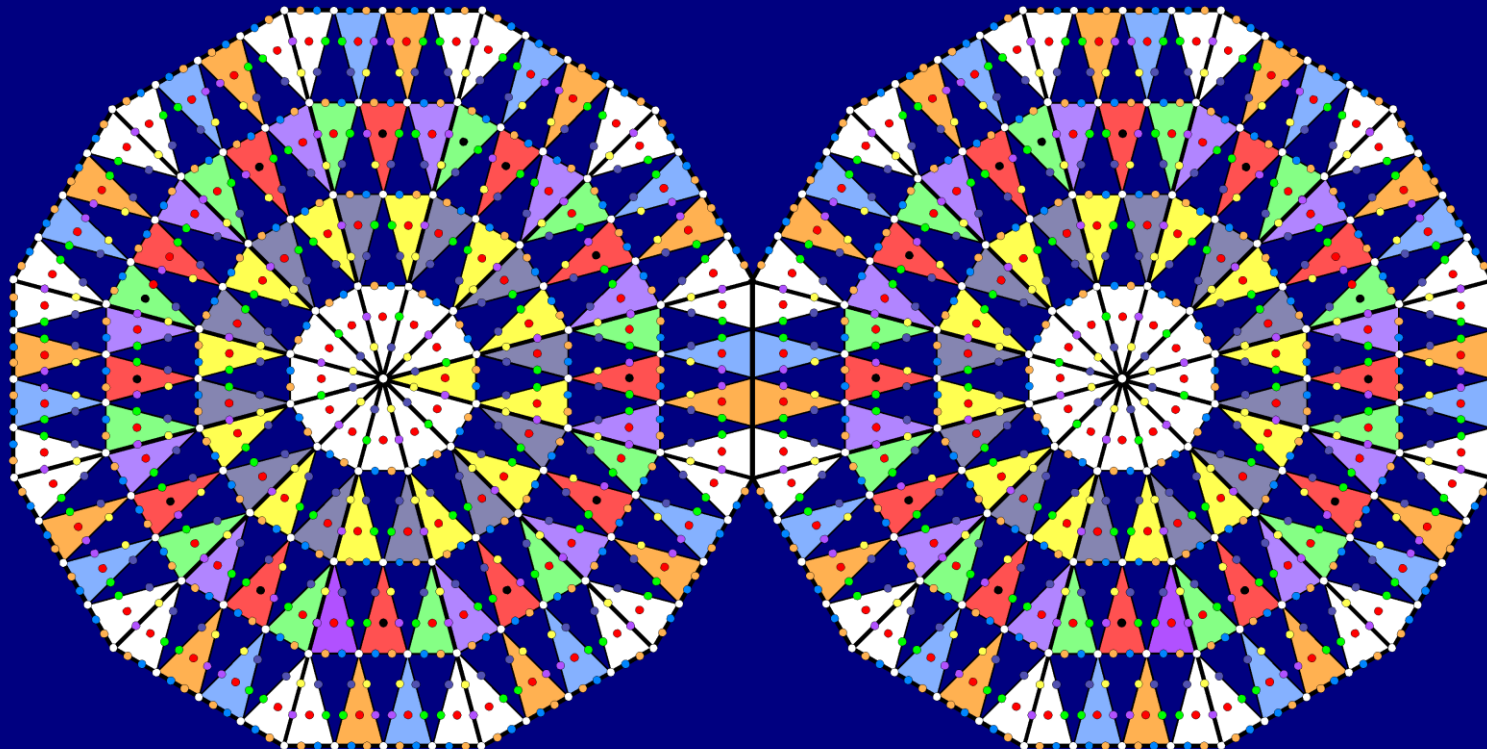$$85 = \begin{array}{cc} 4^0 & 4^1 \\ \square \\ 4^3 & 4^2 \end{array}$$

7

Figure 10. 1680 yods surround the centres of the 24 sectors of two joined dodecagons outside their root edge. They symbolise the 1680 circularly polarised oscillations in each of the ten standing waves in the $E_8{\times}E_8$ heterotic superstring.

again illustrating the role of the Tetrad. Taking into account that 12 yods on each internal edge of a sector apart from the centre of the dodecagon are shared with adjoining sectors, there are (84–12=**72**) yods per sector, where **72** is the number of Chesed, the *fourth* Sephirah from the top of the Tree of Life. Of these, 10 (=1+2+3+4) are corners of tetractyses symbolising Kether, Chokmah and Binah and **62** are hexagonal yods
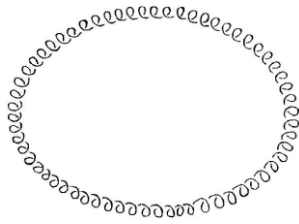

Figure 11. The helical whorl has 1680 turns.

symbolising Sephiroth of Construction, where **62** is the number value of *Tzadkiel*, the Archangel corresponding to Chesed. Therefore, the number of yods in the 120 tetractyses of a dodecagon = 12×**72** + 1 = 865. 13 yods lie along the shared edge of the pair of dodecagons, leaving (865–13=852) yods outside it. The number of yods in the dodecagon outside the root edge that surround the centres of each sector = 852 – 12 = 840, where

$$840 = \begin{matrix} 84 \\ 84 \quad 84 \\ 84 \quad 84 \quad 84 \\ 84 \quad 84 \quad 84 \quad 84 \end{matrix}$$

and

$$84 = \begin{matrix} 1^2 \quad\quad 3^2 \\ \square \\ 7^2 \quad\quad 5^2 \end{matrix}$$

yet again illustrating the basic role of the Tetrad in defining properties of sacred geometry with universal significance (as will become evident shortly). A pair of joined dodecagons therefore has (840+840=1680) yods outside their shared edge that surround the centres of their 24 sectors, where 24 = 1×2×3×4 (Fig. 10). This is the number of turns in each of the ten helical whorls (Fig. 11) of the 'ultimate physical atom,' or UPA (Fig. 12), observed over 100 years ago by the two Theosophists Annie Besant and C.W. Leadbeater, using a siddhi, or psychic ability, known to Indian yoga. Each whorl makes 2½ outer revolutions about the vertical axis of spin of the UPA and 2½ inner revolutions, spiralling 840 times in circles in each half. We see that each dodecagon containing 840 yods distributed outside the root edge about the centres of its sectors encodes the number of coils in half a whorl; the two identical dodecagons correspond to its inner and outer halves. The 'Malkuth' level of the microscopic Tree of Life, that is, each whorl of the superstring, is encoded in the tenth regular polygon and in the last of those constituting the inner form of the Tree of Life. Each one of the 1680 yods both shaping the pair of dodecagons and surrounding the centres of their 24 sectors denotes a circularly polarised oscillation or wave in a whorl. These yods represent the 'material' manifestation of the 240 tetractyses of the 24 higher-order tetractyses making up the pair of dodecagons. The question arises: what do these higher-order tetractyses denote? Twenty-four of them are associated with each whorl, that is, 240 higher-order

Figure 12. The UPA.

tetractyses are associated with the UPA itself. The gauge symmetry group E_8 describing the unified superstring force has 240 so-called 'generators' corresponding to the 240 so-called 'non-zero roots of its Lie algebra.' To each generator corresponds a kind of charge analogous to the electric charge of a particle. Each charge is the source of a gauge field, i.e., a particular kind of force. Each higher-order tetractys represents one of the 240 gauge charges, and 24 such charges are spread along each whorl, making a total of (10×24=240) for the superstring itself. As 1680 = 24×70 and the Tree of Life comprises 70 yods when its 16 triangles are turned into tetractyses (see Figure 5), this number is the number of yods in 24 *separate* Trees of Life. This reflects the fact that the 24 gauge charges manifesting in each whorl are all independent and 'smeared' along its length in a way analogous to that proposed in the $E_8 \times E_8$ heterotic model of the superstring. 70 is also the number of yods corresponding to Sephiroth of Construction in the higher-order tetractys making up each sector of the dodecagons, showing again that the gauge charges are *wholes* — complete Tree of Life entities in themselves.

9

The last statement should answer the following question that may have arisen in the reader's mind during the discussion above of how the number 1680 was embodied in the pair of dodecagons: what, if any, is the significance of the seemingly arbitrary way in which the 840 yods in each dodecagon were selected — namely, picking out the 840 yods that surround centres of sectors? The yod at the centre of a tetractys denotes Malkuth, the material manifestation of the whole symbolised by the tetractys. The six yods surrounding it at the corners of a hexagon denote the six Sephiroth of Construction above Malkuth. There are 84 yods surrounding the centre of the next higher-order tetractys (see Figure 9). On the cosmic level, these correspond to the 42 subplanes of the six *superphysical* planes of consciousness and the 42 subplanes of their cosmic counterpart (see Article 5 for more details). On the microcosmic level, they denote the number of circularly polarised waves in a quarter of a revolution about the axis of the UPA, i.e., a 90° turn in space. In conformity with its ten-fold nature — both in ordinary space and in 10-dimensional space-time — each whorl makes *ten* half-revolutions, five in an outer twisting and five in a more tightly knit, double helical twist. This 5:5 split corresponds to the division in the Tree of Life between the five uppermost Sephiroth, which span its Upper Face, and the five lowest Sephirah forming its Lower Face. The yod at the centre of a higher-order tetractys denotes the Malkuth level of manifestation of a Tree of Life system and so does not enter the count of the yods symbolising differentiations of Sephiroth *beyond* Malkuth. Each of the 24 gauge charges spread out along each whorl *is* that manifestation. What appears at first sight to be merely *an ad* hoc choice of yods contrived to generate the number 840 in each dodecagon is in fact a selection *dictated* by the proper, physical interpretation of their higher-order tetractys sectors.
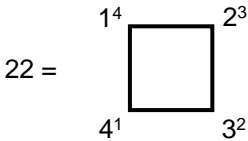
Another similarity between the powers of the square and dodecagon to embody various superstring parameters like **248** and **168** is the fact that the latter number is the sum of the first 12 odd integers after 1 (Fig. 13) and that the shapes of both polygons are defined by the number 12 because a square divided into

168 =

Figure 13

tetractyses has 12 yods along its boundary, whilst a dodecagon is delineated by its 12 corners. As the template for constructing objects possessing sacred geometry, the tetractys unveils a beautiful harmony between geometry and arithmetic that exists *only in such objects*.

5. Encoding of 336 in the pair of dodecagons

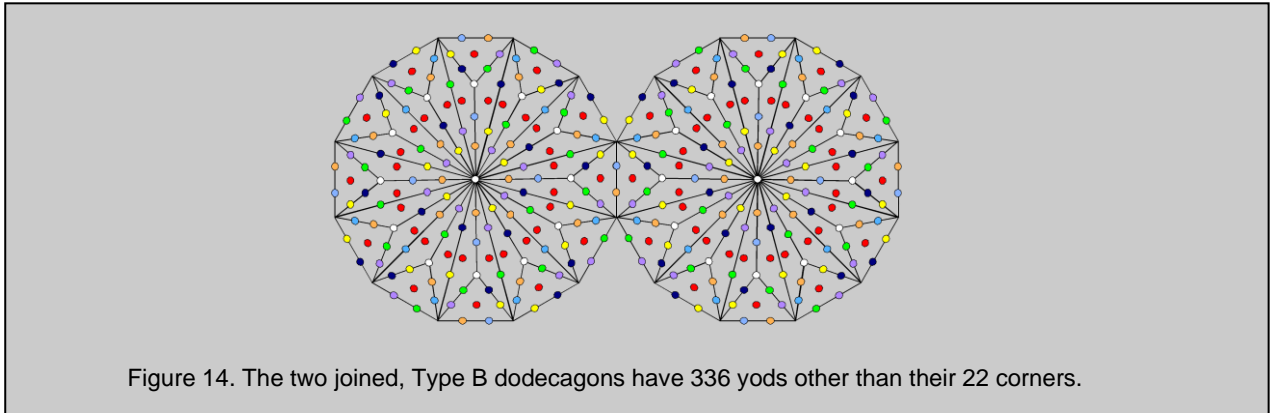Two joined dodecagons have 22 corners, where

22 =

Its 24 (=1×2×3×4) sectors have 24 corners. This illustrates once more how the integers 1, 2, 3, & 4 express properties of the dodecagon. As there are 22 compactified dimensions in **26**-dimensional space-time, each corner of a dodecagon can be regarded as symbolising the *higher* dimensions of space. The ten corners outside the root edge of one dodecagon symbolise the ten curled-up dimensions generating the ten string-like components of the superstring (see Article 2). The twelve corners of the other dodecagon denote the twelve remaining compactified dimensions. These consist of the five dimensions that define a compactified space whose symmetry generates the superstring gauge group E_8 and the seven curled-up dimensions predicted by supergravity theory. The centres of the two dodecagons symbolise the two transverse dimensions of **26**-dimensional strings.

Notice that the division:

$$22 = 3 + 7 + 12$$

of the 22 letters of the Hebrew alphabet into the three mothers: aleph, mem & shin, the seven double

consonants: beth, gimel, daleth, caph, pe, resh, & tau, and the twelve simple consonants has a remarkable geometrical counterpart in the 22 corners of the pair of joined dodecagons. This is because the three mother letters correspond to three corners symbolising the curled-up dimensions beyond supergravity space-time that generate the three major whorls of the UPA, the seven double consonants correspond to

Figure 14. The two joined, Type B dodecagons have 336 yods other than their 22 corners.
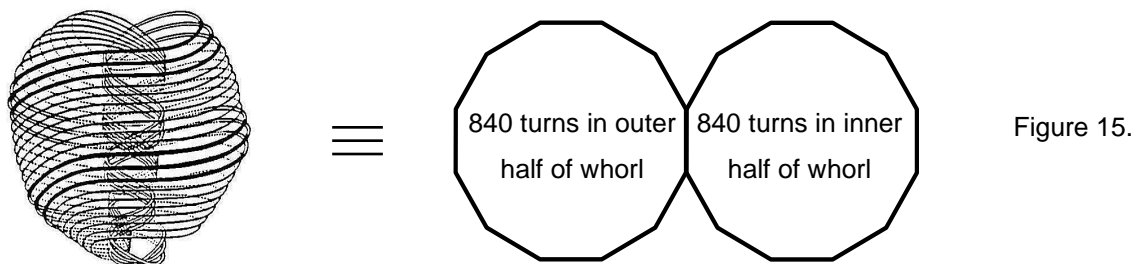
seven corners that denote the curled-up dimensions generating its seven minor whorls and the twelve simple consonants correspond to the corners of the other dodecagon symbolising the five E_8-generating dimensions and the seven curled-up, supergravity dimensions.

Property number 22 in the list given in Section 2 states that the number of yods in two joined dodecagons other than their 22 corners is 336 (Fig. 14), where

$$336 = \begin{array}{cc} 2^2 & 6^2 \\ 14^2 & 10^2 \end{array}$$

Starting with the *Tetrad*, $2^2 = 4$, the sum of the squares of the *four* integers 2, 6, 10 & 14 spaced *four* units apart is 336. It was stated in the last section that the inner and outer halves of a whorl makes 2½ revolutions. This means that its 1680 turns are spread over five revolutions, 336 turns per revolution. Each

840 turns in outer half of whorl ≡ 840 turns in inner half of whorl   Figure 15.

turn in a revolution of a whorl is symbolised by a yod in the two joined, Type B dodecagons other than their 22 corners and two centres, that is, *new yods generated by their construction from tetractyses*. The **168** such yods in each dodecagon denote the number of circularly polarised oscillations made during the traverse of either half of one revolution of a whorl.

With their sectors turned into the next higher-order tetractys after the Pythagorean tetractys, each dodecagon was found earlier to contain 840 yods outside their root edge surrounding their centres. Each dodecagon represents half of a whorl made up of 840 coils *(*Fig. 15). Enfolded in each Tree of Life belonging to CTOL are the two sets of seven regular polygons. The lowest ten Trees of Life have **140** enfolded polygons, where **140** is the number value of *Masloth*, the Mundane Chakra of Chokmah. Their 20 dodecagons contain (10×1680=16800) yods outside their root edges surrounding the centres of their 240 sectors representing the 240 gauge charges of E_8. This Tree of Life representation of the superstring shows that the Godname ADONAI prescribes the number 16800 because its number value **65** is the number of SLs in the lowest ten trees of CTOL. The number of corners of the 70 polygons enfolded on either side of these trees is **351**, which is the number value of *Ashim*, the Order of Angels assigned to Malkuth. **351** is also the sum of the first **26** integers, showing how the Godname YAHWEH with number value **26** prescribes the ten overlapping Trees of Life representing the ten whorls of the superstring. Each dodecagon has ten

11

corners outside its root edge. The ten dodecagons enfolded in the lowest ten trees have (10×10=100) external corners. This means that the 60 polygons enfolded on either side of the ten trees that are not dodecagons have (**351**–100=251) corners. Article 5 (6) discussed the significance of the number 251 in relation to the superstring. The concurrence *in the same context* (the lowest ten trees) of this structural parameter encoded in the first six types of polygons with the number 16800 encoded in the seventh type is remarkable evidence for the Kabbalistic basis of superstring theory and the author's identification of the UPA as a superstring. Notice that the proportion of the dodecagons to the first six types enfolded in ten trees, namely, 10:60, corresponds in the tetractys-transformed Tree of Life to the 10:60 pattern of yods created by the ten Sephiroth and the 60 hexagonal yods. Indeed, the inner form of the Tree of Life has the *same* pattern, namely, the ten corners of a dodecagon outside the root edge that it shares with the other 13
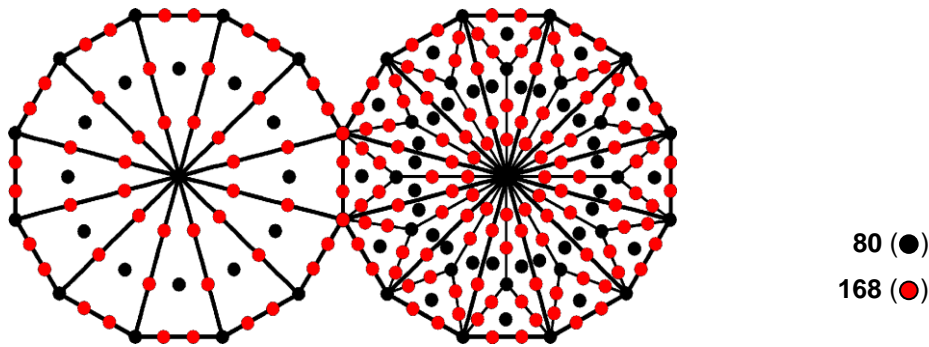

80 (●)

168 (●)

Figure 16. **248** yods in joined Type A & Type B dodecagons surround their centres. **80** yods are
corners or centres of tetractyses and **168** yods are hexagonal yods or the endpoints of the root edge.

polygons with 60 corners. Just as the points in space where the ten Sephiroth are located define the basic geometrical aspect of the Tree of Life — its Malkuth level — so their counterpart in its inner form — the pair of dodecagons — quantitatively embodies the physical nature of the Tree of Life in the subatomic world as measured by the 1680 coils in each helical whorl that makes up the UPA/superstring. One can only affirm the hermetic axiom: "as above, so below."

6. Encoding of 248 & 168 in Type A & Type B dodecagons

Up till now, both dodecagons have been regarded as the same type. Suppose that one of the dodecagons is Type A and that the other is Type B. The former contains **73** yods and the latter has 181 yods. The pair of joined dodecagons has 250 yods. We saw above that the first six types of polygons enfolded in ten overlapping trees of Life have 251 corners. The topmost corner of the hexagon enfolded in the tenth tree coincides with the lowest corner of the hexagon enfolded in the 11th tree. 250 corners are therefore intrinsic to these polygons. They correspond to the 250 yods in a Type A and Type B dodecagon, thereby further demonstrating the holistic nature of the pair of dodecagons. As Articles 5 and 6 discuss in more detail, the UPA is formed from a d-brane embedded in **26**-dimensional space-time that wraps itself around ten circular dimensions to generate the ten independent whorls of the superstring. A point on each whorl is specified by 25 spatial coordinates, so that the ten whorls have (10×25=250) such variables. We see that the two types of dodecagon embody the number of variables defining the positions of *ten* points in **26**-dimensional space-time which can never coincide, i.e., they belong to ten curves that never touch or intersect. This is highly significant, for it is evidence for the ten-fold nature of the superstring. **248** yods surround the centres of the joined dodecagons, where **248** is the number value of *Raziel*, the Archangel of Chokmah (Fig. 16). They symbolise the **248** gauge bosons of E_8 that transmit the unified superstring force. **246** yods are outside the root edge, where **246** is the number value of *Gabriel*, the Archangel of Yesod. According to the properties listed on pages 3 and 4, the Type A dodecagon has **49** geometrical elements, where **49** is the number of EL ChAI, Godname of Yesod, and the Type B dodecagon has 121 geometrical elements. The pair of separate dodecagons has 170 geometrical elements, i.e., they have **168** geometrical elements surrounding their centres. In other words, *168 geometrical elements are needed to construct their 48 tetractyses, starting from their two centres*. The pair of *joined* dodecagons embodies the superstring dynamical parameter **248** because **248** yods are needed to construct them, starting from their two centres, and the pair of *separate* dodecagons embodies its structural parameter **168** because **168** geometrical elements are needed, as well as **168** yods, starting from a dodecagon divided into its sectors. This is more remarkable evidence of how the Malkuth aspect of the microscopic manifestation of the Tree of Life is encoded in the last of the regular polygons constituting its inner form. **48** is the number value of *Kokab*, the Mundane
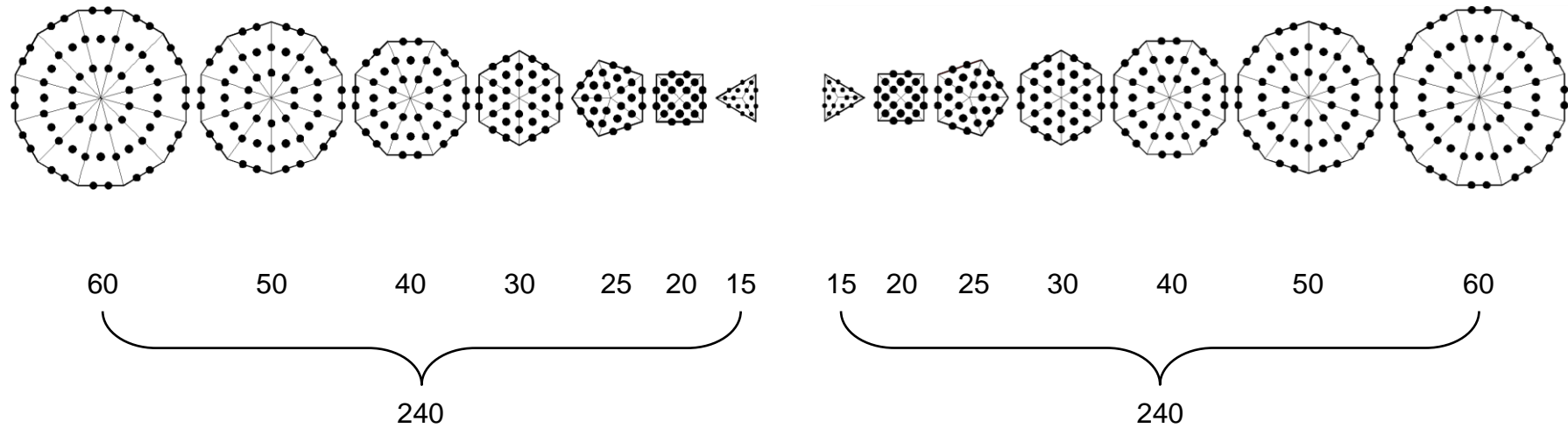
60   50   40   30   25 20 15   15 20 25   30   40   50   60

240   240

Figure 17. The (240+240) hexagonal yods of the (7+7) regular polygons denote the (240+240) non-zero roots of the heterotic superstring gauge symmetry group $E_8 \times E_8$.

Chakra of Hod, the Sephirah that signifies mental activity and communication. Previous articles discussed how this number is a parameter of the Tree of Life, being the number of corners of the seven separate, regular polygons making up its inner form and the number of corners, edges & triangles making up its outer form. Its superstring interpretation is as follows: as discussed earlier, each of the 24 gauge charges carried by a string component of the superstring/UPA manifests as a circularly polarised standing wave. Each such wave has two orthogonal, plane wave components that are 90º out of phase. Each whorl therefore consists of (2×24=**48**) independent standing plane waves. This 24:24 division manifests geometrically in the Type A dodecagon as the 24 vertices & edges on its boundary and the 24 edges and triangles inside it. The pattern appears in the first (6+6) enfolded polygons as the 24 corners intrinsic to each set. As future articles will demonstrate, it is a characteristic of *any* holistic system possessing sacred geometry. The ten whorls of the UPA/superstring comprise (10×**48**=480) plane waves. The encoding of these in the inner form of the Tree of Life is the set of 240 hexagonal yods in either set of seven separate regular polygons, i.e., their 480 hexagonal yods (Fig. 17). In the case of the first (6+6) enfolded polygons enfolded in ten Trees of Life, the two sets of 240 plane waves are the counterpart of the (240+240) corners of the (60+60) polygons of the first six types. Every hexagonal yod or corner in one set is the mirror image of its counterpart in the other
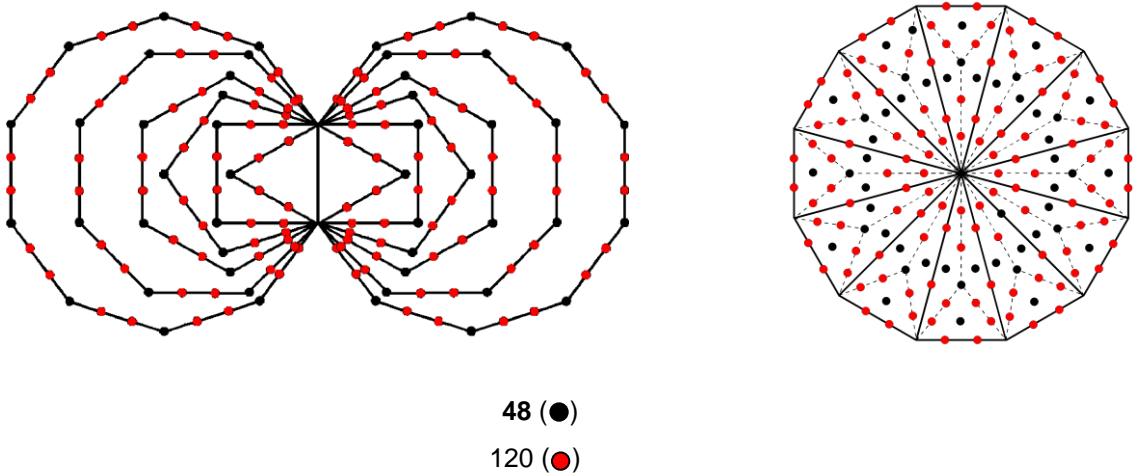

48 (●)

120 (●)

Figure 18. The Type B dodecagon exhibits the same **48**:120 division of its
168 yods other than corners of sectors as the first (6+6) enfolded polygons
do in the **168** yods on their boundaries outside the root edge.

set. Every such pair denotes the two orthogonal plane waves making up each of the 24 circularly polarised oscillations in each of the ten whorls of the superstring constituent of up and down quarks paranormally described over a century ago by the Theosophists Annie Besant and C.W. Leadbeater.

The numbers of corners, sides & triangles surrounding the centres of the separate Type A and Type B dodecagons are:

	Corners	Sides	Triangles
Type A:	12	24	12
Type B:	24	60	**36**
Total =	**36** +	84 +	**48** = 168

There are 84 sides and 84 corners & triangles. This 84:84 division of the **168** geometrical elements in the two types of dodecagons is characteristic of holistic systems. Later articles will provide numerous examples. Its remarkable consequence is that, if we consider the ten dodecagons enfolded on one side of the central pillar of ten overlapping Trees of Life as Type A and their counterparts on the other side as Type B, the ten pairs of separate dodecagons have 840 sides and 840 corners & triangles. This is the *same* 840:840 division as was found for the yods surrounding the centres of the 24 sectors of two enfolded polygons when each sector is a higher-order tetractys. It manifests physically as the 840 circularly polarised waves in each half of a whorl of the $E_8 \times E_8$ heterotic superstring. Here is clear evidence that the superstring's oscillatory form, as described by Besant & Leadbeater, conforms to the geometry of the pair of dodecagons in the inner Tree of Life. The Type A dodecagon has **48** elements surrounding its centre and the Type B has 120 elements surrounding its centre. The counterpart of this **48**:120 division in a Type B dodecagon with **168** yods other than the 13 corners of its 12 sectors is the **48** yods at corners & centres of tetractyses and the 120 hexagonal yods on their 60 sides (Fig. 18). Its counterpart in the **168** yods outside

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the root edge on the sides of the first (6+6) enfolded polygons is their **48** corners and the 120 hexagonal yods on their 60 sides. Equivalent holistic structures always display analogous patterns.

7. Conclusion

The dodecagon and the pair of joined dodecagons in the inner form of the Tree of Life can be transformed into two types, depending on whether their sectors are turned into single tetractyses or three tetractyses. The ten Godname numbers prescribes their resulting properties, suggesting that they embody numbers of cosmic significance. This is confirmed by the way they encode the numbers **168** and 336, these being the number of coils in, respectively, half and one revolution of a string component of the superstring constituent of up and down quarks, proved by the author to have described paranormally with a yogic siddhi over a hundred years ago by the two Theosophists Annie Besant and C.W. Leadbeater. A pair of dodecagons is found to embody the number (1680) of such coils in all five revolutions of a string when their sectors are constructed from the next higher-order tetractys. As each of the ten strings of the superstring is the space-time manifestation of a Sephirah, it, too, can be represented by a Tree of Life. This means that the superstring is modelled by ten overlapping trees in whose inner forms are enfolded 20 dodecagons containing 16800 yods that are outside their root edges and surround the centres of their 240 sectors. These correspond to the 16800 coils in the superstring. They denote circularly polarised oscillations in its ten strings generated by the 240 gauge charges of the superstring symmetry group E_8, which are 'smeared' along each whorl, 24 per whorl. These gauge charges are the physical meaning of the 24 higher-order tetractys sectors in the pair of dodecagons enfolded in each overlapping Tree of Life as the last of the regular polygons constituting its inner form. A Type A dodecagon and a Type B dodecagon separately have **168** geometrical elements surrounding their centres, whilst, joined together, they have **248** yods unshared with the outer form of the Tree of Life or, alternatively, **248** yods surrounding their centres. These yods symbolise the **248** gauge bosons of E_8. Superstring physics has been reduced to sacred geometry and then to number as its generating principle. Truly, as the Pythagoreans declared: "Number is form and form is number."

References

1. Phillips, Stephen M. Article 9: "How the square encodes the superstring parameters 168 & 248," http://smphillips.mysite.com/Article09.pdf, pp. 2–9.

2. Phillips, Stephen M. Article 1: "The Pythagorean nature of superstring and bosonic string theories," http://smphillips.mysite.com/Article01.pdf, p. 4.

3. The number of yods in a polygon with n corners is: N = 6n + 1 (Type A); N = **15**n + 1 (Type B). A Type A dodecagon (n=12) has **73** yods. A Type B dodecagon has 181 yods.

4. Formulae for a polygon with n corners:

	Type A	Type B
Number of hexagonal yods in polygon with n corners =	5n	13n
Number of corners of triangles =	n + 1	2n +1
Number of sides of triangles =	2n	5n
Number of triangles =	n	3n
Number of corners & sides =	3n + 1	7n + 1
Number of corners & triangles =	2n + 1	5n + 1
Number of sides & triangles =	3n	8n
Number of corners, sides & triangles =	4n + 1	10n + 1

5. Ref. 1.

6. Phillips, Stephen M. Article 5: "The superstring as microcosm of the spiritual macrocosm," http://smphillips.mysite.com/Article05.pdf.