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Appendix II: About 154

Nature's Patterns

Geometric principles around us

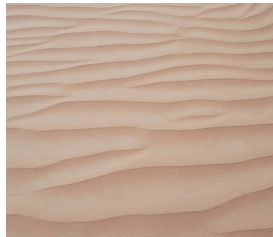
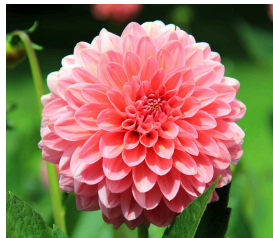
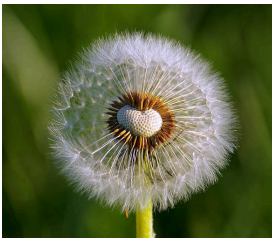
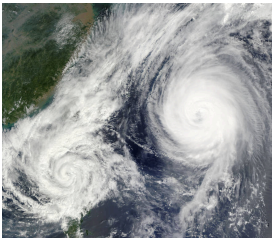
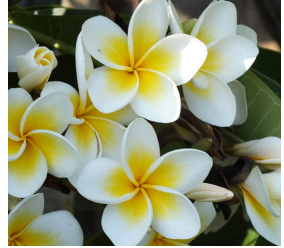
Imagine you are strolling through a forest. You see trees, shrubs, plants, butterflies, and birds. At first glance, it might seem like there are no geometric shapes around. Yet, everything works in wonderful patterns. You might have never seen a particular type of butterfly or tree before, but somehow your eyes and brain know what you're looking at. How? The answer lies in the repetitive laws of nature.

Consider the spiral of a chameleon's tail, the stripes of a zebra, the feathers of a peacock, the curves of a nautilus shell, the shape of a starfish, or the ripples created by wind moving grains of sand. These patterns are not random; they are structured and intricate, catching the eye and intriguing the mind. Whether you're walking through a park, gardening, trekking, or scuba diving, the presence of these patterns is undeniable. But what governs these designs? Is nature operating on clear principles, or is it all just chaotic?

Ideal geometry can never be perfectly observed in nature, and no two forms are exactly the same. However, there is a strong correlation to mathematics and geometry. This is evident as we can recreate many natural patterns on a computer (page 18). It is this approximation that brings order to apparent randomness. Mathematics allows us to recognise and categorise the things we see, distinguishing between different archetypes.

For example, fracture patterns found in mud cracks appear in various forms, yet all share an overall consistency. Despite the chaotic and dynamic appearance of nature, ordering principles are at play, showing how different aspects of the world are intrinsically connected. What is beauty if not the expression of maths itself? Geometry is the visualisation of numbers in space (page 54), whose most fundamental forms such as triangles, squares, and pentagons are directly reflected in the number of leaves in a flower. Beyond the obvious shapes, it is the connecting patterns that show us the power of geometry.

Next time you see a peacock, notice the patterns and the beauty it invokes in you. Open your eyes to see the world anew — you might discover a new pattern you never noticed before.



Molecular Geometry

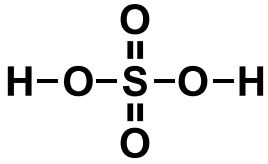
Crystal structures

As the atomic structure is geometric, it is no surprise that when atoms bond, they do so to fill their orbital shells in specific spatial arrangements. This is traditionally visualised using the Lewis structure, a two-dimensional diagram representing atomic bonds. In 3D, this is represented by models like the ball-and-stick, space-filling, and crystal lattice, highlighting the geometric nature of molecular structures. For example, carbon dioxide (CO_2) has a linear shape, boron trifluoride (BF_3) forms a trigonal planar shape, methane (CH_4) is tetrahedral, and sulphur hexafluoride (SF_6) is octahedral. Carbon molecules like C_{60} , named *fullerenes* after Buckminster Fuller (page 34), exhibit a structure of an Icosidodecahedron, an Archimedean solid (page 52).

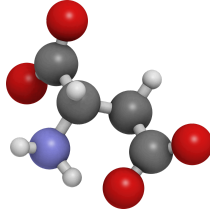
Noble gases, which do not form bonds and are inert, are aligned vertically on the far right of the Periodic Table (page 72). These gases, including helium, neon, argon, krypton, xenon, and radon, have outer shells that are filled with the maximum number of electrons. Most noble gases exhibit octahedral geometry, except for helium, which is spherical. This configuration appears fundamental to their stability. The majority of simple bonds between organic elements are based on the *octet rule*, which follows the same principles.

Crystals form when many molecules or atoms bind together in uniform clusters, growing into highly geometric structures. These crystals have signature shapes based on repeating patterns of unit cells, which can be cubic, cube-related, or hexagonal. The symmetry and structure of the entire crystal are reflected in these geometric arrangements. For instance, the galena crystal follows a cubic arrangement and can form cubes or octahedrons depending on environmental conditions like pressure, temperature, and impurities. Pyrite, or fool's gold, is another versatile crystal that can form into any of the five Platonic solids and even some Archimedean solids (page 54). These geometric structures are also found in other substances like ice, metals, ceramics, and molecules essential for life.

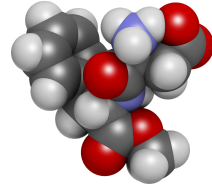
Chemical Models



Lewis structure

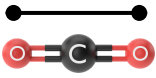


Ball and stick model

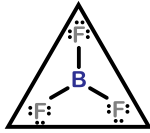


Space-Filling model

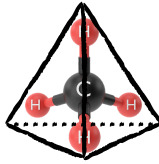
Molecular Geometry



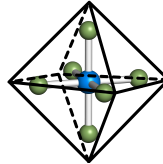
CO₂
Line



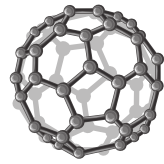
BF₃
Triangle



CH₄
Tetrahedron

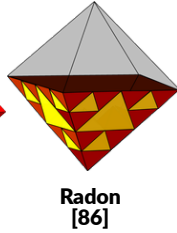


SF₆
Octahedron

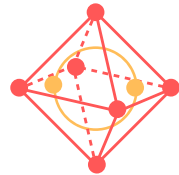


Fullerene C₆₀
Icosidodecahedron

Noble Gases

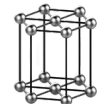
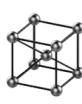
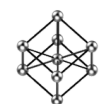
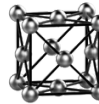
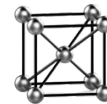
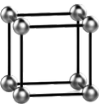
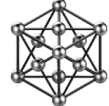
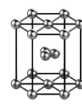
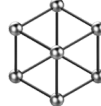
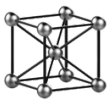


Octet Rule

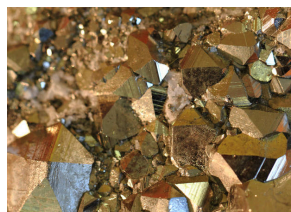


$$2S + 6P = 8$$

Crystal Lattices



Crystal Structures



Sacred Geometry Pattern

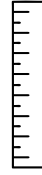
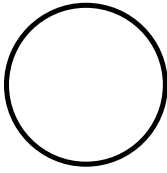
From the Circle to Metatrons Cube

All forms in Sacred Geometry are created using a compass and ruler, symbolising the duality of female (curve) and male (straight line). Everything begins with a dot and a circle, the *Monad*, representing the universe's origin and totality. The initial circle's radius, set to 1, determines the pattern's size relative to this first distance. By centring the compass on any point of the circle's circumference and drawing a second circle with the same radius, the Vesica Piscis is formed. Subsequently, the overlapping circles create two nodes (intersection points), which serve as the points of further construction. Adding a third circle to one node forms the Trinity. Adding a fourth circle creates a motif with the Trion Re at its centre. This produces the first petal shape of the Flower of Life. With every new circle, new nodes are created, which generates a systematic blueprint of expansion.

With a total of seven circles, the Seed of Life emerges, which can extend again to the Egg of Life (13), the Flower of Life (19), then the Flower of Light (37), and finally with 61 circles, the Flower of Heaven. From these 61-circles, the Fruit of Life can be extracted, comprising 13 full adjacent circles, without any overlap. Connecting their centres forms the Metatron's Cube, a complex design, which marks the final stage of the Sacred Geometric sequence, believed to encode the multidimensional universe.

Regardless of the size of the initial compass opening, this process will produce exactly the same ratios within its structure, which demonstrates its capacity to exist at all scales. At each stage of expansion, more information is encoded into the mandala, as more nodes emerge from the overlapping circles. These can be connected in diverse ways, generating many regular forms, including triangle, squares, pentagons, and hexagons. Interestingly, some shapes such as the heptagon (7 sided) cannot be constructed precisely using this technique, which further illustrates the limitation of form within reality. Conceptually, this Sacred Geometric Pattern produced from overlapping circles can be seen to represent the feminine aspect of reality, from which all straight-edged masculine forms emerge.

The Toolset



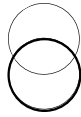
Drawing compass (Circle)
Feminine

Ruler (Line)
Masculine

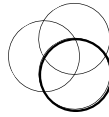
Sacred Geometry Pattern



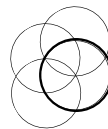
Circle
(1)



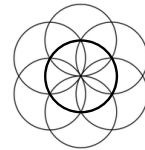
Vesica Piscis
(2)



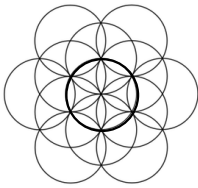
Trinity
(3)



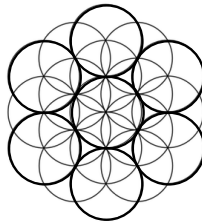
Trion Re
(4)



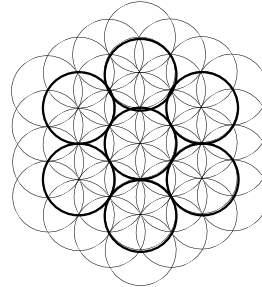
Seed of Life
(7)



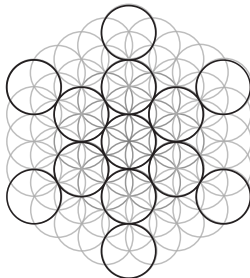
Egg of Life
(13)



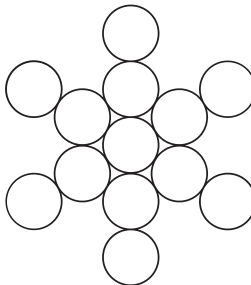
Flower of Life
(19)



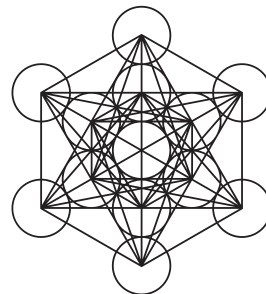
Flower of Light
(37)



Flower of Heaven
(61)



Fruit of Life
(13)



Metatron's Cube

Seed of Life

Star of David, Yin and Yan and the Simple Solids

The Seed of Life holds a variety of symbols within its seven overlapping circles. The central circle of the Seed of Life marks six nodes. Highlight three of them [1.1] to create an equilateral triangle [1.2]. Mark the other three nodes [1.3] and draw an upside-down triangle [1.4]. This will create the Star of David inside the central circle [1.5].

For the Yin and Yang, draw the perfect Seal [2.2]. Within the Seed of Life, the two opposite circles are exactly adjacent to each other and do not overlap. Mark the centres of them in opposite colours [2.3] and use their curved edges to create the wave seen in the Yin and Yang [2.3]. Erase the rest for the final symbol [2.4].

Similar to the creation of the Star of David in the Seed of Life, you can also use the six nodes in the central circle to create the shadow projections of three of the five Platonic Solids.

For the shadow projection of the Tetrahedron, mark three nodes of the central circle of the Seed of Life [3.1]. Connect them to create a triangle [3.2]. Use the ruler to connect the corners of the triangle to the centre of the Seed of Life [3.3]. Shade the three triangular spaces in different shades of the same colour (here yellow) [3.4] to create a 2D perception of the 3D Tetrahedron [3.5].

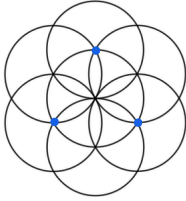
Similarly, mark three nodes in the Seed of Life [4.1] and draw another triangle [3.2]. This time, mark all six nodes inside the central circle [3.3] and connect them in a hexagon [3.4]. Highlight the image in two different shades of colour, with the lighter being the triangle at the centre [3.5]. This creates the shadow projection of the Octahedron [3.6].

For the Cube, start with the six nodes of the central circle [4.1] and draw a hexagon [4.2]. Now, mark every other corner of the hexagon and draw a line to the central node [4.3]. Shade each area in three shades of the same colour [4.4]. This creates the respective 2D perception of the Cube [4.5].

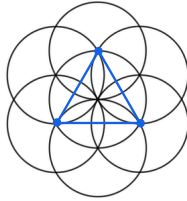
As all the projections of the Tetrahedron, Octahedron, and Cube appear already in the Seed of Life, they are known as the simple solids.

Star of David

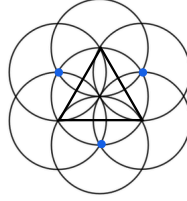
1.1



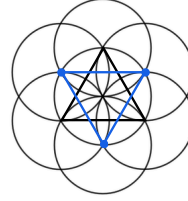
1.2



1.3



1.4

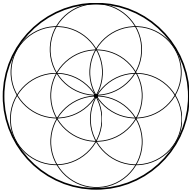


1.5

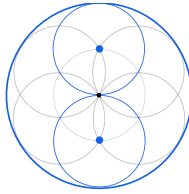


The Yin and Yang

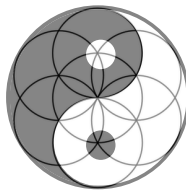
2.1



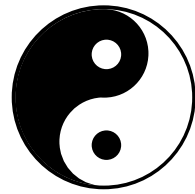
2.2



2.3

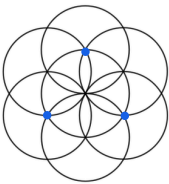


2.4

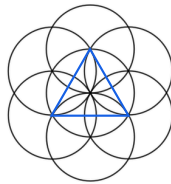


The simple solids

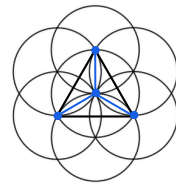
3.1



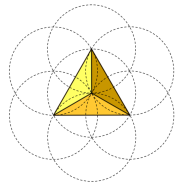
3.2



3.3



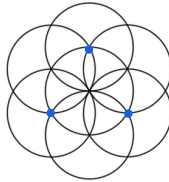
3.4



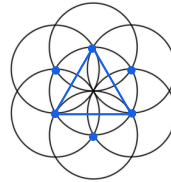
3.5



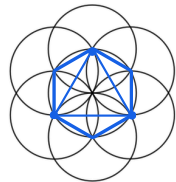
4.1



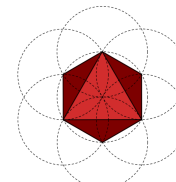
4.2



4.3



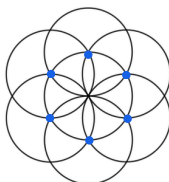
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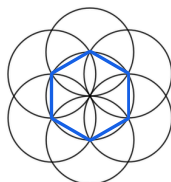
4.5



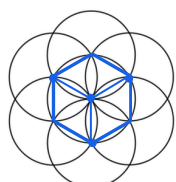
5.1



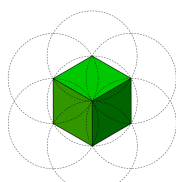
5.2



5.3



5.4



5.5

