The Pattern Pieces

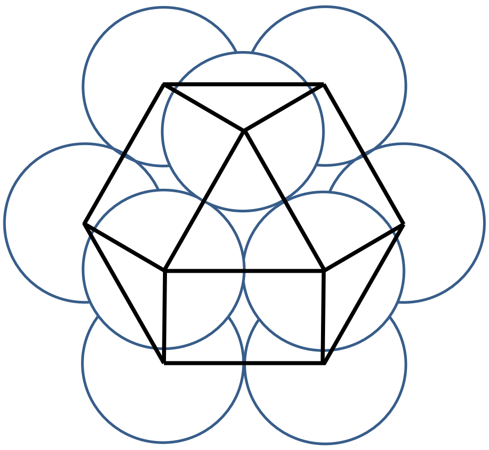
Folder 3

The Pattern Numbers

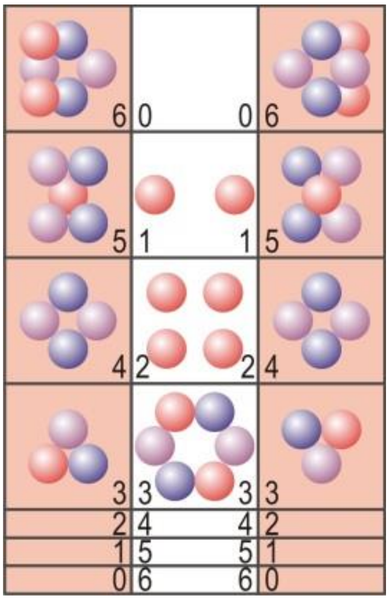
"With the advent of Pattern numbers the Pattern idea progresses from being a mere curiosity to being a core science."

The Pattern number system is a generalization of the Pattern Code that was discovered in the cuboctahedron-shaped Cluster of twelve spheres.

Cuboctahedron-shaped Cluster of Spheres



The Pattern Code



The Pattern number system is the language by which the Pattern is expressed. It is a type of modelling language which could be used for building models of the Pattern. Pattern numbers could also be used as descriptors of natural structures, such as atoms and crystals.

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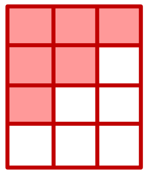
The Pattern Number System

The Pattern number system reveals an intimate relationship between number and structure.
For example:

Number	Number Values	Structure
3 + 0 = 3	3,0	
2 + 1 = 3	2,1	
1 + 2 = 3	1,2	
0 + 3 = 3	0,3	



Pattern Number Definition

A Pattern number is a natural number that is the sum of a pair of natural numbers, e.g. 2 + 1 = 3. In general, a Pattern number is the sum of a pair of variables, a + b. The variables are complementary and their sum is, therefore, always a constant c.

Pattern Number Values

Example: The Pattern number values for pn3 are:

3,0 (3 + 0)
2,1 (2 + 1)
1,2 (1 + 2)
0,3 (0 + 3)

Only natural numbers are allowed.

A Pattern number is only one (member) of a pair of Pattern numbers. The Pattern numbers that are shown above are one half of the Pattern number pairs only.

Basic Pattern Number properties

A higher Pattern number includes all its lower Pattern numbers, e.g. pn3 includes ('contains') pn2, pn1 and pn0. It forms a Pattern number series. This feature is reminiscent of the manner in which Russian dolls fit together.

Like complex numbers, Pattern numbers also consist of two components, or variables, a and b. Unlike complex numbers, however, they are independent of any coordinates, and there is a complementary relationship between the sets of variables of Pattern numbers.

The different a,b pairs of a Pattern number form step-wise progressions which represent (discrete) Pattern time.

Note that Pattern numbers, Pattern codes and Pattern equations are different expressions describing the same phenomenon.

Pattern Number Uses

The Pattern number system could be used as a kind of constructor's language. It does not, therefore, have all the standard mathematical operations, mainly addition and multiplication.

Pattern number structures could be very simple, like tilings of squares and circles, cubes and spheres, or very complex, like hypercubes and hyperspheres. Typical Pattern number structures are; columns, walls, blocks, pyramids, plates, cubes, discs, spheres, cones and clusters. In general, regular geometric shapes could be defined by the Pattern number system. A tiling is the default structure of any Pattern number.

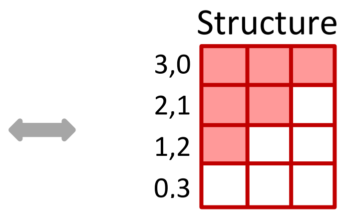
The common binary digital system that is used in computers is represented by pn1 (only 0s and 1s).

Pattern Number Example: pn3

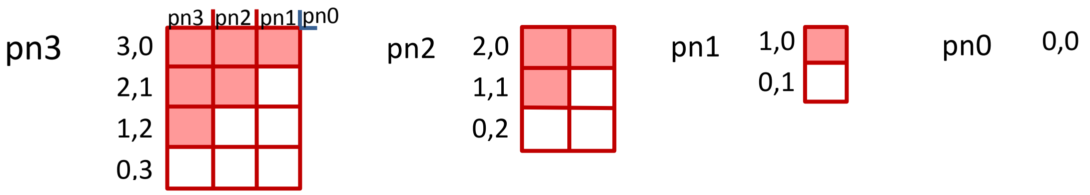
A Pattern number (pn) consists of pairs (a,b) of natural numbers whose sum is a constant, i.e. a + b = c. For example, pn3 and its basic tiling structure is shown below.

Number

3 + 0 = 3
2 + 1 = 3
1 + 2 = 3
0 + 3 = 3



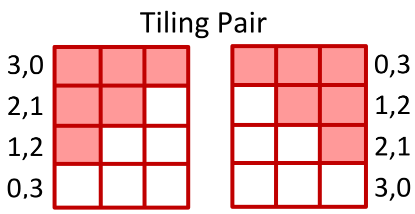
A Pattern number includes an inner set of Pattern numbers, e.g. pn3 includes pn3, pn2, pn1 and pn0.



A symmetric pair of Pattern numbers should not be confused with the a,b pairs of a Pattern number.

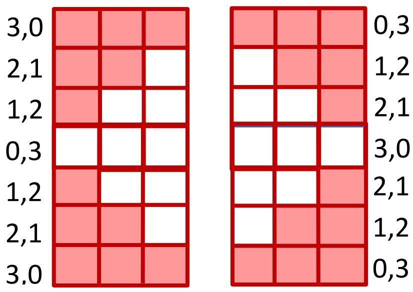
pn3 Pair

a + b = c	**c = b + a**
3 + 0 = 3	3 = 0 + 3
2 + 1 = 3	3 = 1 + 2
1 + 2 = 3	3 = 2 + 1
0 + 3 = 3	3 = 3 + 0



A reflected Pattern number pair is a Pattern number pair mirrored in a horizontal mirror.

Reflected
pn3 Pair



The top and bottom rows above are identical and could, therefore, be an indication of an overlap in another (additional) dimension. A cylinder could be formed by gluing the top and the bottom rows in an overlapping fashion.

The addition of Pattern numbers is possible. For example, pn3 equals pn1 plus pn2. The transitional value pairs (the middle rows) of the sum, however, need to be deduced. They do not automatically flow from the addition operation. Subtraction is also possible, but it is not a simple operation.

Squaring and cubing of Pattern numbers is possible.

pn(c) x pn(c) = squared pn(c) where c = 1, 2, 3, etc.

pn(c) x pn(c) x pn(c) = cubed pn(c) where c = 1, 2, 3, etc.

The Pattern Number Structures

Although the typical tiling structure of simple Pattern numbers is two-dimensional, the structures of more complex Pattern numbers could have more than two dimensions. Structures of pn6 are used here to illustrate the space and time dimensions of Pattern numbers. (The time dimension is represented as a space dimension.)

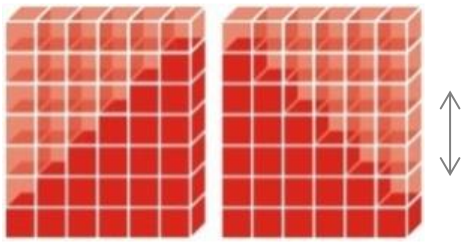
1D + Time Pattern Numbers

The basic structure of the pn6 pair looks like a wall pair composed of cubes, or cells. It represents one space dimension together with a time dimension.

Wall Pair

(pn6 Pair)

a b	b a
6,0	0,6
5,1	1,5
4,2	2,4
3,3	3,3
2,4	4,2
1,5	5,1
0,6	6,0



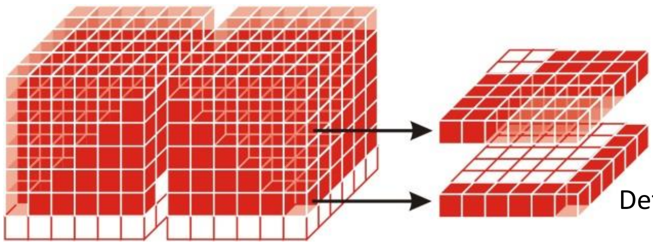
The bi-directional arrow shows the simultaneously increasing and decreasing manner of Pattern numbers. The increasing/decreasing happens in steps and yields a discrete (Pattern) time.

2D + Time Pattern Numbers

2D Pattern numbers are simply squared Pattern numbers, e.g. $\mathbf{(a + b)^2 = a^2 + ab + ba + b^2 = c^2}$.
The 2D + Time structure of the squared pn6 pair is a block pair.

Block Pair

(Squared pn6 Pair)



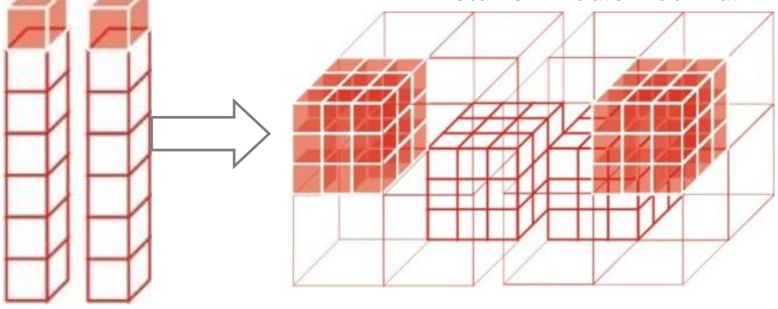
3D + Time Pattern Numbers

3D Pattern numbers are simply cubed Pattern numbers, e.g. $\mathbf{(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3 = c^3}$.

The 3D + Time structure of the cubed pn6 pair looks like a simple column pair composed of seven blocks each. The detail inside the blocks is not shown, except for the detail of the middle block pair of the column pair.

Column Pair

(Cubed pn6 Pair)



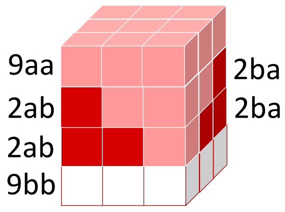
The 3D + Time Pattern numbers actually represent four space dimensions as shown above.

Construction of the pn3 Cleft Pyramid

The structures of squared and cubed Pattern numbers could be transformed so as to yield more Pattern number structures, such as pyramids and cubes. The transformation of the block structure, of the squared pn3, into a half pyramid is shown here to illustrate the process.

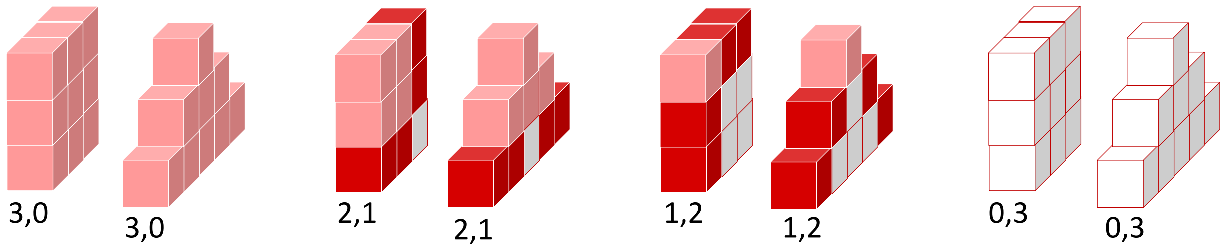
In general, $pn(a + b)^2$ equals aa + ab + ba + bb. The values of pn3 are:

Values:	3,0:	3x3 + 3x0 + 0x3 + 0x0	=	9aa + 0ab + 0ba + 0bb
	2,1:	2x2 + 2x1 + 1x2 + 1x1	=	4aa + 2ab + 2ba + 1bb
	1,2:	1x1 + 1x2 + 2x1 + 2x2	=	1aa + 2ab + 2ba + 4bb
	0,3:	0x0 + 0x3 + 3x0 + 3x3	=	0aa + 0ab + 0ba + 9bb



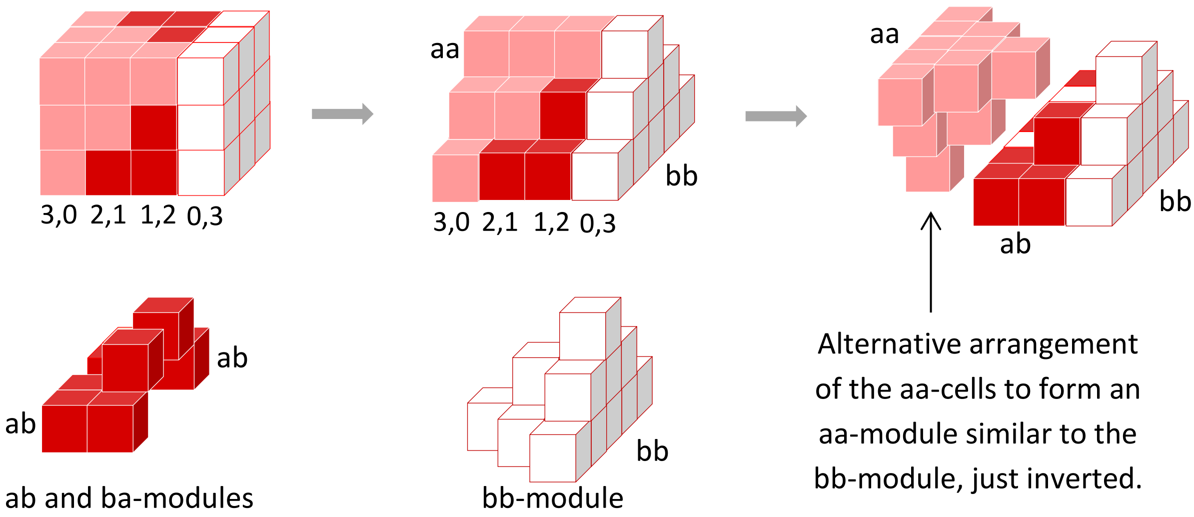
Each row of values that is shown above could be represented by a horizontal square plate (layer) consisting of nine cells (cubes) each as shown in the diagram on the right. The layers (squares of cells) are stacked to form a block of cells. Each layer could be transformed into a triangle of cells as shown below. Note that the layers have now been rotated into a vertical position.

Transformation of each square layer of cells into a triangular layer of cells



The triangles could be stacked as shown below. The aa-module (of cells) in the drawing on the right is separated (and rearranged) to show that the bb, ba and ab-modules form one half of a step pyramid.

Transformation of a module into one half of a cleft step pyramid



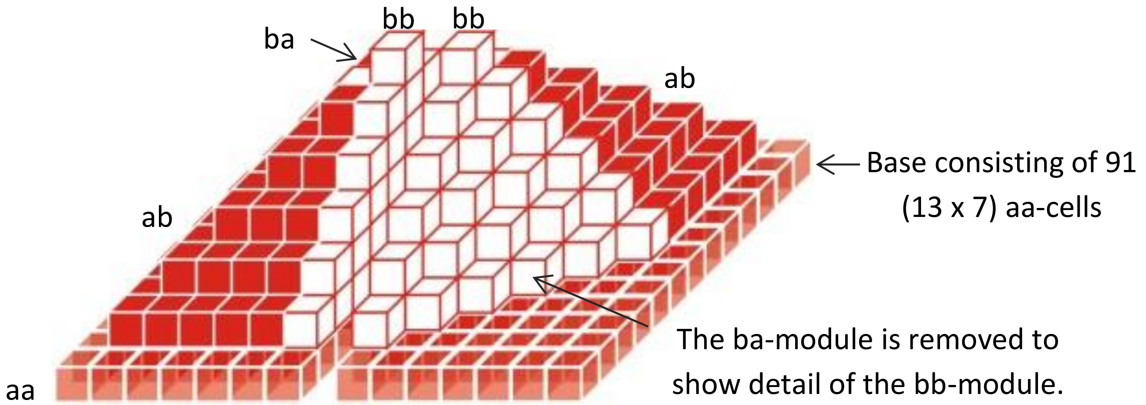
The 14 cells of the aa-module could be compressed into a rectangle of 14 cells to form a base for the half pyramid. A full base, however, would need 28 cells, and it is, therefore, not possible to construct a proper base for the pn3 pyramid.

The pn6 Cleft Pyramid

It was shown in P03:5 that the block structure of pn3 could be transformed into a half step pyramid. A pair of symmetrical blocks would yield a cleft step pyramid consisting of two symmetrical half pyramids if the same process that is described in P03:5 is followed. A symmetrical block pair is the structure that is derived from a squared Pattern number pair.

The cleft step pyramid that is obtained from the squared Pattern number 6 pair, $(a + b)^2 = 6^2$ & $6^2 = (b + a)^2$ is shown below. (The steps required to obtain the pyramid are the same as those in P03:5*)*

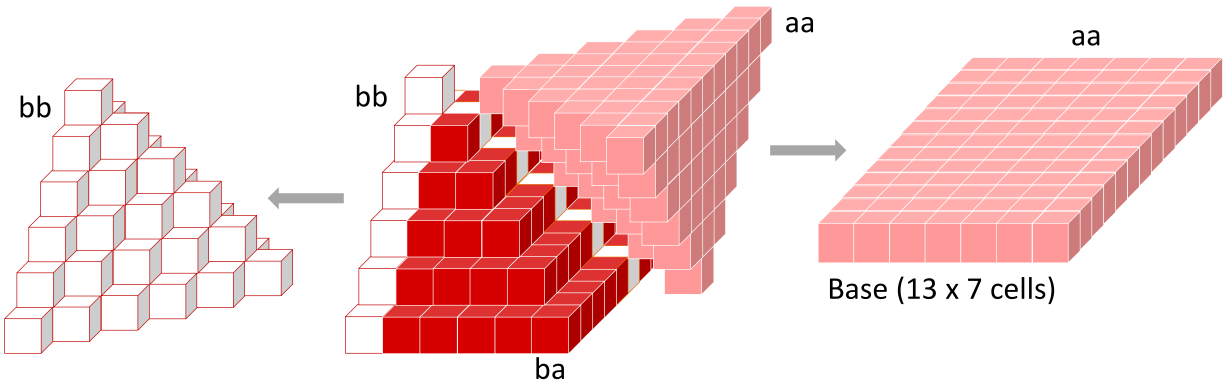
The Pattern Number 6 Cleft Pyramid



The Base of the Cleft Pyramid

The base that is required for of each half pyramid measures 13 x 7 (91) cells. The number of aa-cells (inside the different the layers of the aa-module that is shown below) equals 91 (0 + 1 + 4 + 9 + 16 + 25 + 36 = 91). This is the exact number of aa-cells required for a base of a pn6 half pyramid.

The Different Modules of a Pattern Number 6 Half Pyramid



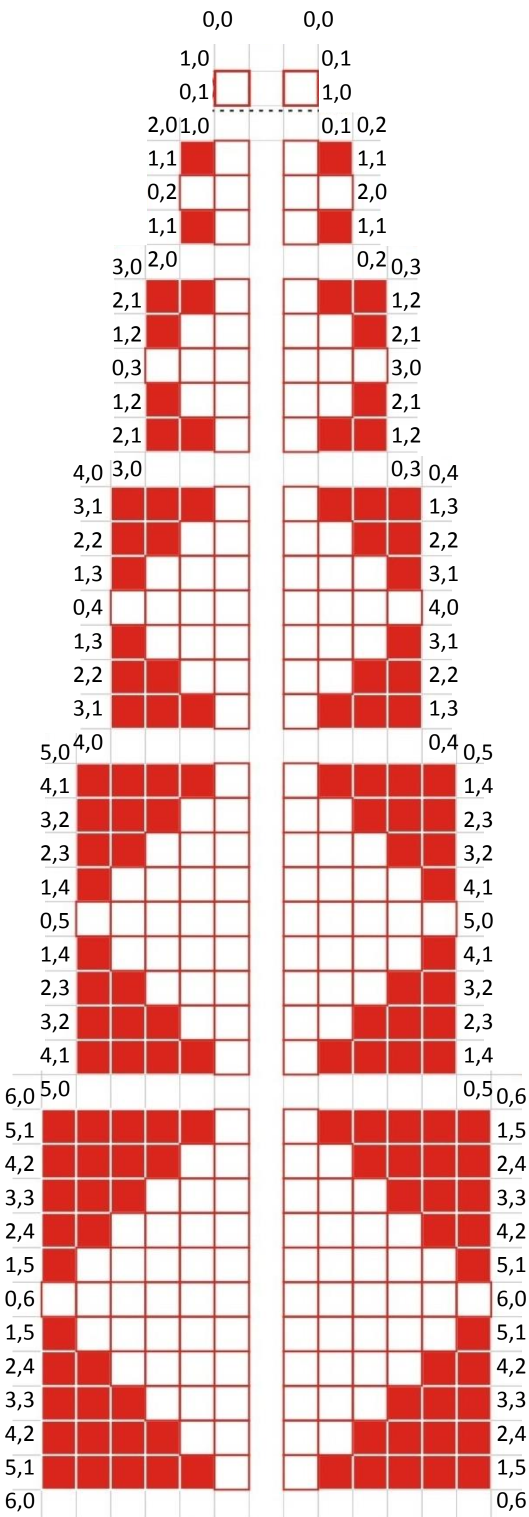
The pn6 is the only Pattern number that yields a perfect base as shown above. There is, however, another Pattern number that also yields an acceptable base. It is pn12 the base of which is exactly twice as thick as the other layers of the pn12 pyramid. The pn12 pyramid, therefore, has a double layer base.

(The number of cells in the aa-module of the pn3 half pyramid is only 14 whereas a complete base requires 28 cells (4 x 7=28). There is a pattern here because pn3 yields a base of half the size required, pn6 yields the perfect base and pn12 yields double the size of the base that is required.)

The pn6 Cleft Pyramid Plates

The spread-out plate pairs of the pn6 cleft pyramid (see P03:6) reveals the composition of the layers of the pyramid. It appears that each layer represents a different reflected Pattern number pair. The top and bottom rows of each reflected Pattern number pair are, however, absent. (The reason for this is provided in the description of the Symmetric Periodic Table in thepatternbook.com.)

Note that only the top part of each (reflected) Pattern number pair is shown in the table on the right.



The Pattern Number Pairs

a + b = c & c = b + a

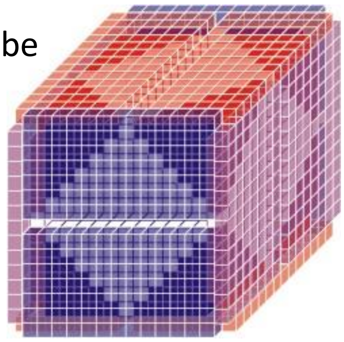
	a,b	b,a
pn0 plate pair	0,0	0,0
pn1 plate pair	1,0	0,1
	0,1	1,0
pn2 plate pair	2,0	0,2
	1,1	1,1
	0,2	2,0
pn3 plate pair	3,0	0,3
	2,1	1,2
	1,2	2,1
	0,3	3,0
pn4 plate pair	4,0	0,4
	3,1	1,3
	2,2	2,2
	1,3	3,1
	0,4	4,0
pn5 plate pair	5.0	0,5
	4,1	1,4
	3,2	2,3
	2,3	3,2
	1,4	4,1
	0,5	5,0
pn6 plate pair	6,0	0,6
	5,1	1,5
	4,2	2,4
	3,3	3,3
	2,4	4,2
	1,5	5,1
	0,6	6,0

The pyramid plates that are shown above are a good illustration of a Pattern number series (see P03:2).

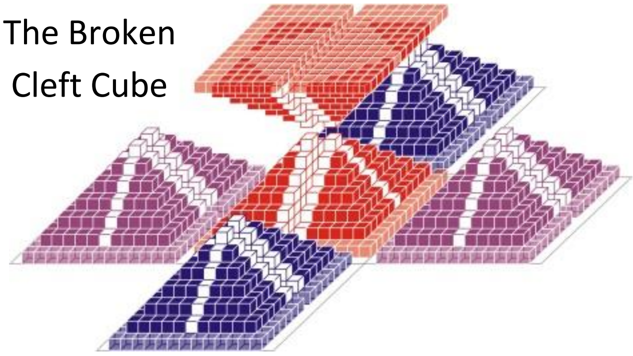
The pn6 Cleft Cube

It is shown, in P03:4, that the basic structure that is obtained from the cubed pn6 pair is a column pair. The subsequent transformation of the column pair yields the cleft cube that is shown below. (The cleft cube is also called the Pattern Cube.)

The Cleft Cube



The Broken Cleft Cube



A simple method to obtain the cleft cube is to multiply the cleft pyramid, which was obtained from the squared pn6 pair (see P03:6), with the value of the Pattern number itself. This multiplication by six yields six cleft pyramids as shown above, right. The cleft cube on the left shows the six assembled cleft pyramids. (Another, more complicated, method to achieve the same transformation is illustrated in *The Pattern of All Things* in thepatternbook.com.)

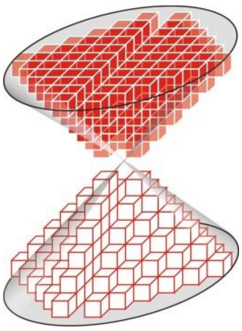
If the same (multiplication) method is applied to any other Pattern number it will not yield a cube. The reason is that a cube has six faces and that multiplication by six only would result in a proper cube.

The Light-cones and the Life-cones of the Cleft Cube

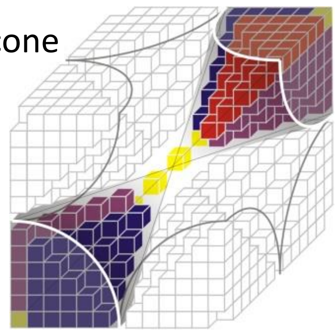
The structure of the cleft cube, as shown above, reveals that it is composed of seven concentric cleft cubes. The six pyramid bases form the outer (seventh) cleft cube.

The concentric cubes of the cleft cube could be viewed as a kind of progression that reflects the history of an expanding cleft cube. The expansion of the cube happens in all directions, i.e. six orthogonal (face) directions and also in the eight diagonal directions to the vertices of the cleft cube. The expansion of the cleft cube could be measured as the quadratic sequences (1^2, 2^2, 3^2, 4^2, 5^2, 6^2) that are represented by the individual layers of its three Light-cones as well as the quadratic sequences (1^2, 2^2, 3^2, 4^2, 5^2, 6^2, 4^2, 2^2) represented by the individual (diagonal) layers of its four Life-cones. One Light-cone and one Life-cone are shown below.

A Light-cone



A Life-cone



The uniqueness of the pn6 structures, i.e. the perfect cleft pyramid and the cleft cube, compared to the structures of the other Pattern numbers, is clear. It points to pn6 being a very special Pattern number.

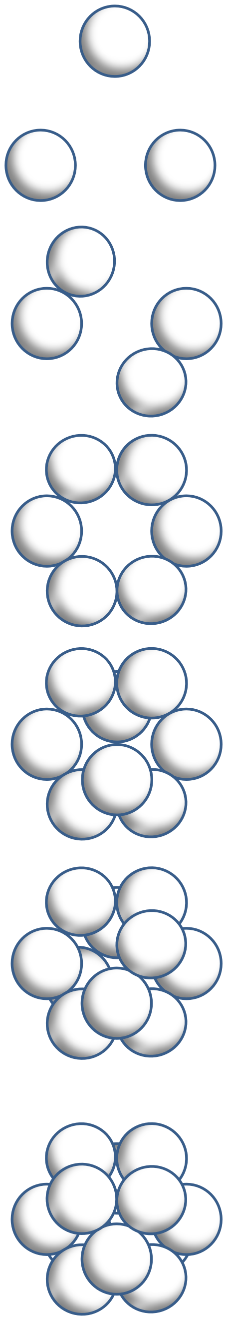
Pattern Numbers in Atoms

The relationship between Pattern numbers and electron orbital configurations is illustrated in the diagram below. (The Pattern number pairs are the same as the cleft pyramid plates as shown in P03:7.)

The Pattern Number Pairs

	a,b	b,a
pn0 pair	0,0	0,0
pn1 pair	1,0	0,1
	0,1	1,0
pn2 pair	2,0	0,2
	1,1	1,1
	0,2	2,0
pn3 pair	3,0	0,3
	2,1	1,2
	1,2	2,1
	0,3	3,0
pn4 pair	4,0	0,4
	3,1	1,3
	2,2	2,2
	1,3	3,1
	0,4	4,0
pn5 pair	5.0	0,5
	4,1	1,4
	3,2	2,3
	2,3	3,2
	1,4	4,1
	0,5	5,0
pn6 pair	6,0	0,6
	5,1	1,5
	4,2	2,4
	3,3	3,3
	2,4	4,2
	1,5	5,1
	0,6	6,0

Related Electron Orbital Configurations



s - orbital

p - orbital

d - orbital

f - orbital

g - orbital

h - orbital

i - orbital

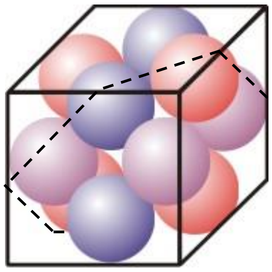
The Symmetric Periodic Table (SPT) in thepatternbook.com illustrates the relationships between the Pattern numbers and the electron configurations in a comprehensive, but also revolutionary, manner. It shows the structure of the Symmetric Periodic Table, a 3D periodic table of the chemical elements that matches the Light-cones of the cleft cube.

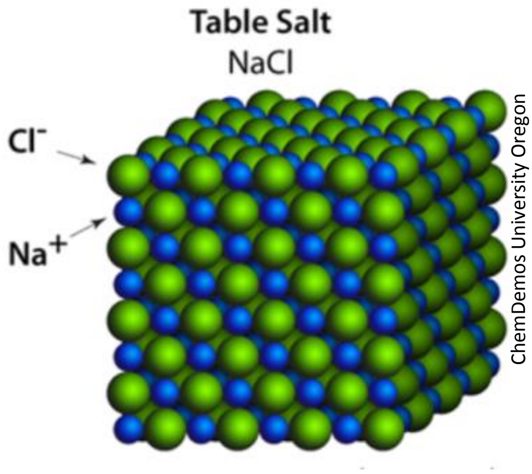
Note that he GSM that is described in Folder 4 contains the electron SPT, the muon SPT and the tau SPT.

Pattern Numbers in Crystals

Pattern number 6, which is the special Pattern number, originates in a cuboctahedron shaped cluster of spheres (see P03:1). The different sphere configurations of the Pattern code are obtained by slicing the cluster. One such slicing is shown below. (All the possible ways of slicing form the Pattern code that is shown in P03:1)

Example of slicing
(Row 3,3:3,3 of Pattern Number 6)





The cluster's sphere configuration is similar to the sodium (Na) ion configuration of the NaCl crystal that is shown above. Pattern numbers are therefore a naturally occurring phenomenon, e.g. in table salt, and are, therefore, natural codes.

Pattern Number 7

The chloride (Cl) ion configuration in the salt crystal has a cubical shape and contains 14 ions. The Pattern number that is represented by the chloride ion configuration (of the salt crystal) is a structure that yields Pattern number 7 (pn7). (The small dots in the drawing below are the chloride ions.)

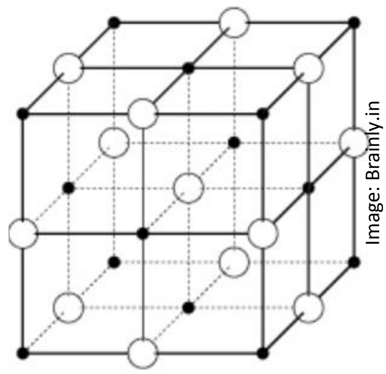
Pattern Number 7

a,b	b,a
7,0	0,7
6,1	1,6
5,2	2,5
4,3	3,4
3,4	4,3
2,5	5,2
1,6	6,1
0,7	7,0

Pattern Number 6

a,b	b,a	
6,0	0,6	
5,1	1,5	
4,2	2,4	
3,3	3,3	← Pivot Point
2,4	4,2	
1,5	5,1	
0,6	6,0	

NaCl Structure



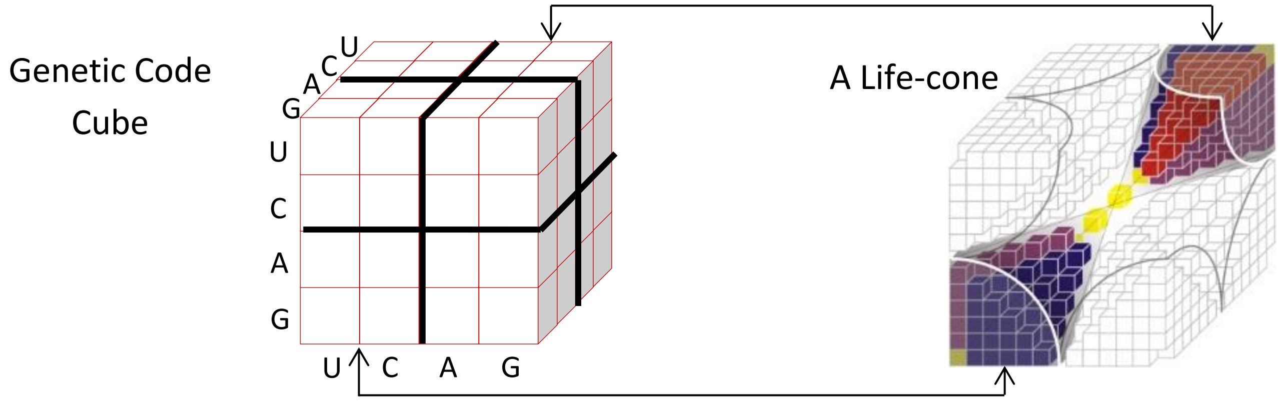
Pattern number 7, however, has no core sphere (see the drawing above) or a pivot point. A pivot point is where the pairs of values have the same numbers (values), such as the 3,3 and 3,3 values of the Pattern number (pn6) above. The main pn7 configurations are also not obtainable with simple ways of slicing.

Other similar crystal structures (other than NaCl) with innate pattern numbers include magnesium oxide, calcium fluoride and lithium fluoride.

Pattern Numbers in Codons

The genetic code consists of RNA codons that code for specific amino acids. Codons of RNA are combinations of three nucleotides. The nucleotides are four similar molecules, each one with a different base. The bases come in two pairs, i.e. GC and AU. (The base U is replaced by base T in DNA.)

Each one of the 64 cells of the cube represents a codon, and it is typically written as CUG, UCU, etc. Each codon has an anti-codon which consists of the other members of the base pairs. The anti-codon of UCU, for example, is AGA.



The genetic code is usually represented by a 2D matrix, but it could also be represented by a cube that is divided into eight blocks (the thick lines) as shown above. Each one of the eight codon block consists of eight codons. Diagonally opposite codon blocks form four codon block pairs. These four codon block pairs map onto the four Life-cones of the cleft cube. One such Life-cone is shown on the right of the genetic code cube above.

The Life-cones consists of ab/ba-cells from three differently-coloured modules of the cleft cube. The three modules in each half (top or bottom) of the Light-cone align around a diagonal chain. The chain consists of seven virtual cells, or links. Each link of the chain represents one of the eight codons of one block of the genetic code cube. (The detail of the codon mapping onto the virtual chains is shown on the Geometric Genetic Code map that is provided in Folder 5 [see P05:12]. The positions of the chain links that represent the remaining eight codons are also explained in P05:12.)

The mapping of the individual cells of the Life-cones is, as yet, unknown. A comparison with the structure of Light-cones, where each cell maps onto a chemical element, may reveal more 'elements' of life.

Light-cones and Life-cones of the pn6 Cleft Cube

Each cell of the cleft cube (Pattern Cube) is referenced by its Pattern State Identity (PSI). The quantum number type PSIs map onto the Light-cones and the genetic 'number' PSIs map onto the Life-cones.

The cleft cube consists only of the three Light-cones and the four Life-cones. The mapping of chemical elements (from the quantum numbers) as well as the mapping of the genetic code onto the Life-cones shows that the cleft cube could be a combined framework that represents everything that exists, living or not living.

The Encoded Earth hypothesis that is explained in Folder 3, Folder 4 and Folder 5 shows that the Pattern Cube could represent a universal Pattern.

Pattern Numbers in the Cosmos

The Pattern numbers and the cosmos structures also seem to match. The structure of the cosmos could also be similar to that of the Pattern cluster.

The following quotations are from the book *The End of Time, The Next Revolution in our Understanding of the Universe* by Julian Barbour, published in 1999.

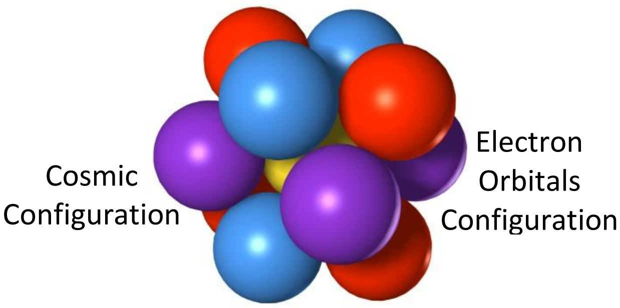
"The most direct and naïve interpretation is that it (the Wheeler-DeWitt equation, $\hat{H}\Psi=0$) is a stationary Schrödinger equation for one fixed value (zero) of the energy of the universe. This, if true, is remarkable, for the Wheeler-DeWitt equation must, by its nature, be the fundamental equation of the universe."

"The Wheeler-DeWitt equation is telling us, in its most direct interpretation, that <u>the universe in its entirety is like some huge molecule in a stationary state</u> and that the different possible configurations of this 'monster molecule' are the instants of time. Quantum cosmology becomes the ultimate extension of the theory of atomic structure, and simultaneously subsumes time."

The Pattern cluster seems to match Barbour's '*huge molecule in a stationary state'* description of the universe.

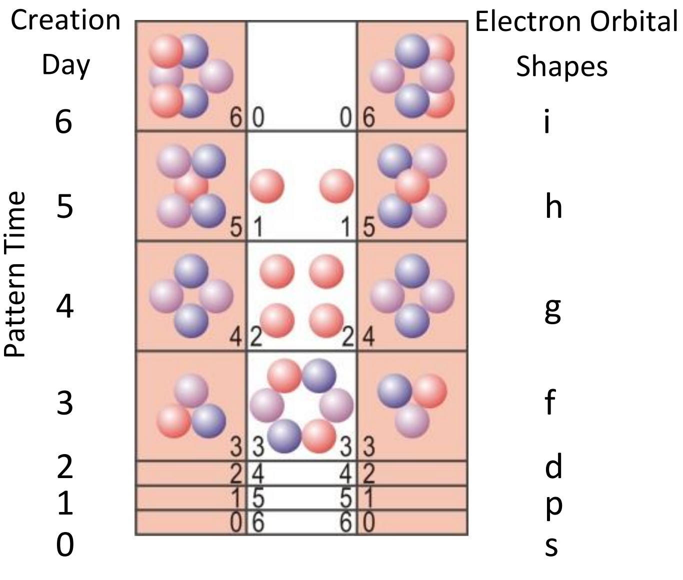
The configurations of the cluster and, therefore, Pattern number 6, also match *the 'different possible configurations of this 'monster molecule'.* These configurations match the orbital shapes of electrons so resonating with the statement that *'Quantum cosmology becomes the ultimate extension of the theory of atomic structure'.* (See the table below.)

The Pattern Cluster



The Pattern Number 6 Configuration

The Pattern Number 6 Configuration Pairs



Barbour also states that the possible configurations of the 'universe molecule' are the '*instants of time'.* These configurations could be the same as the configurations of Pattern number 6 that depicts Pattern time. The configurations in the table above are labelled as the six creation days according to Genesis 1.

The Pattern code depicts a simultaneously increasing and decreasing process that requires higher-dimensionality for its existence. A Mobius band could be used to illustrate this duonity principle of the Pattern (see P05:3 in Folder 5 for an explanation of duonity). The Pattern number system embodies both the origin and the expression of the underlying duonity (and disduonity) of creation.