Square Roots of Squares and Cubes – SR of 1 through 14

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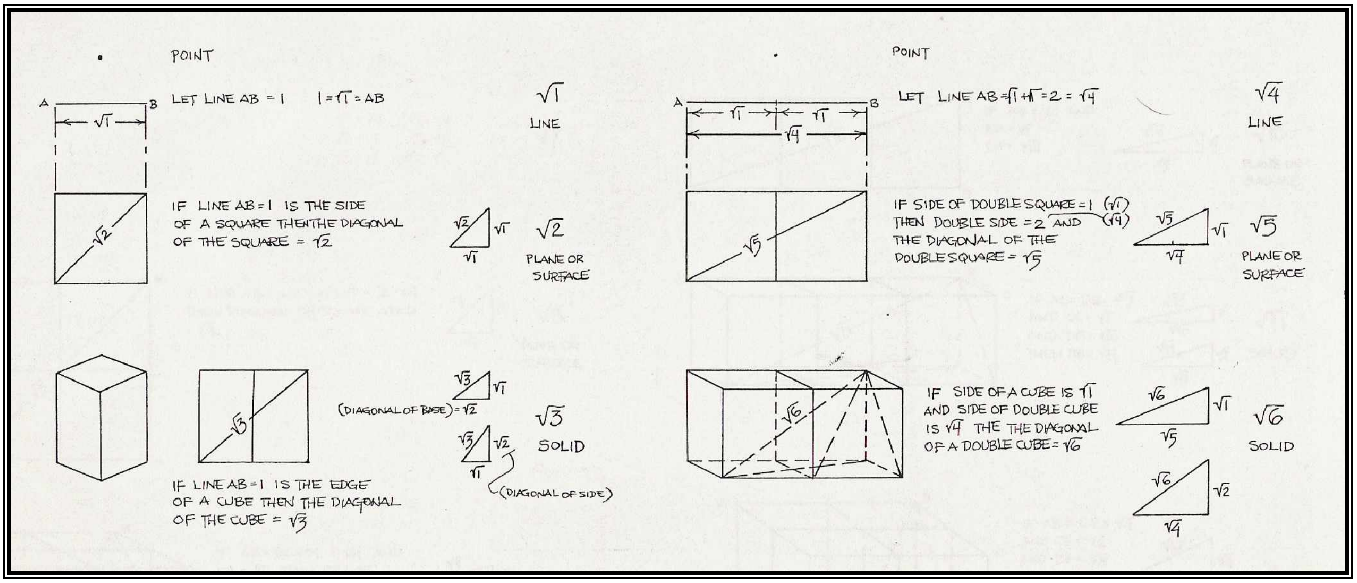
Letting the side of a square or cube = 1, below may be found the occurrences of square roots in a progressive series.

Part I – Square Roots of 1 thru 7

SR	Occurrence
1	Edge of a square or cube
2	Diagonal of a square (or diagonal of the face of a cube)
3	Diagonal from one corner of a cube to its opposing corner
4	Edge of a double square of cube
5	Diagonal of a double square (or diagonal of the face of a double cube)
6	Diagonal from one corner of a double cube to its opposing corner
7	see below (a 'special' case)



Part II – Square Roots of 7 thru 12

SR Occurrence

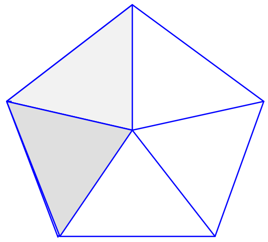
7 see below (a 'special' case)
As you may see from the chart below, one possible solution in the context of cubes would be to find pairs of occurrences, such as: SR1 + SR6 = SR7; SR2 + SR5 = SR7; SR3 + SR4 = SR7, and so forth . . .
In the context of cubes, I was able to find one occurrence of SR of 7 as follows:

P4 to P7 = 2 (or SR4)	$(2 \text{ or SR4})^2 + (\text{SR3})^2 = (\text{P5 to P7})^2$
P4 to p5 = SR3	4 + 3 =
$a^2 + b^2 = c^2$	$7 = (\text{P5 to P7})^2$
$(\text{P4 to P7})^2 + (\text{P4 to P5})^2 = (\text{P5 to P7})^2$	P5 to P7 = SR 7

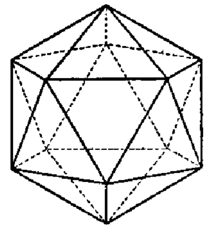
Note in this special case that what you are viewing is an isometric view of double cubes, which, from above, the diagonal is SR6, but in this special case we are viewing the double cube in two dimensions, such that P5 to P7 now = SR7.

A similar case to this occurs with a pentagonal pyramid, where 60 degrees may also be found to equal 72 degrees ($60^o = 72^o$). This would appear to be a rather absurd statement, but that is exactly the way it was given to me one day when I was rounding a corner while driving my car. After a rather interesting set of circumstances, I was able 'solve' this absurdity, more or less as follows:

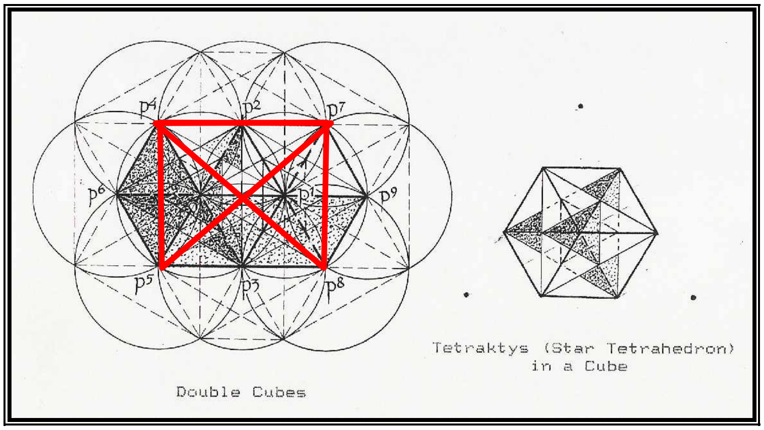
A pentagonal pyramid consists of five equilateral triangles, joined at their edges, the base of which is a pentagon. All of the interior angles of the equilateral triangles are 60 degrees (60^0). However, when a top view of pentagonal pyramid is drawn in two dimensions these very same angles of 60^o now appear to be 72^o (i.e. the interior angles of a pentagon, at the radial point are 72^o x 5 = 360^o). From this exercise I later learned that the pentagonal pyramid is the basis of the icosahedron.



Pentagonal Pyramid



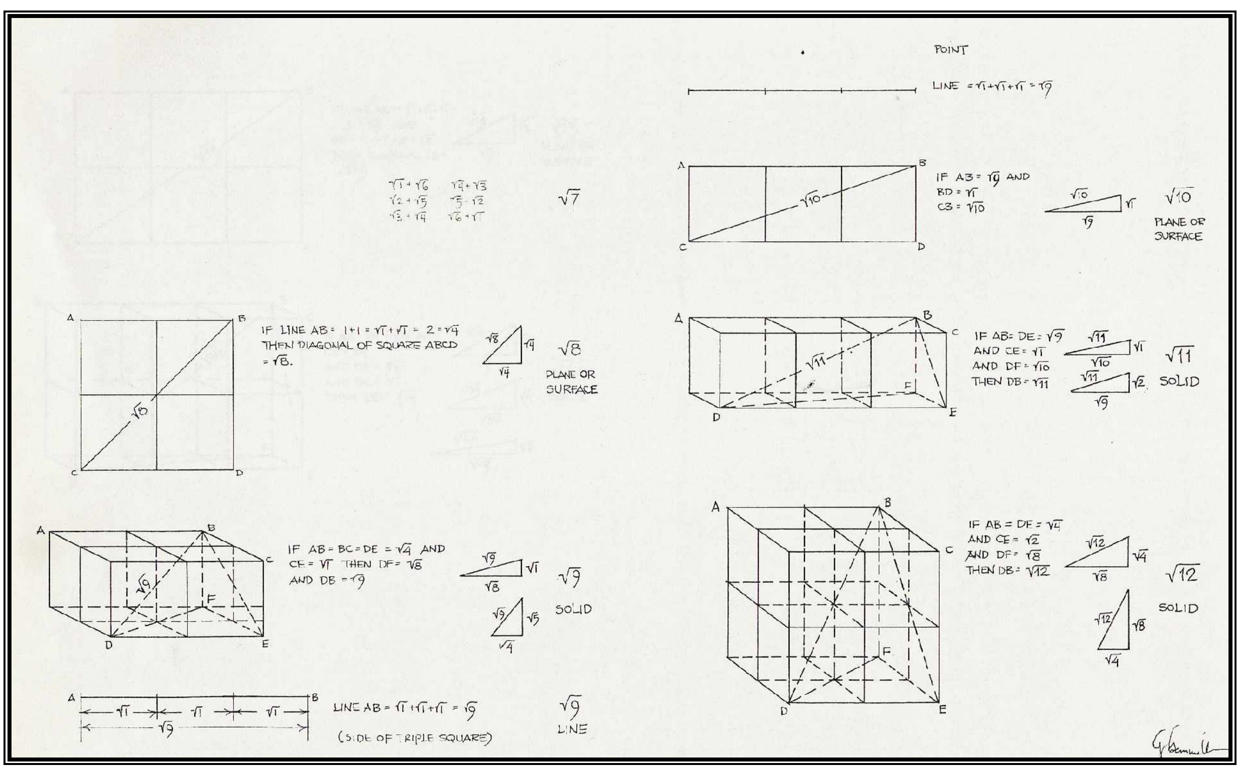
Icosahedron



Special case of P5 to P7 or P4 to P6 = Square root of 7

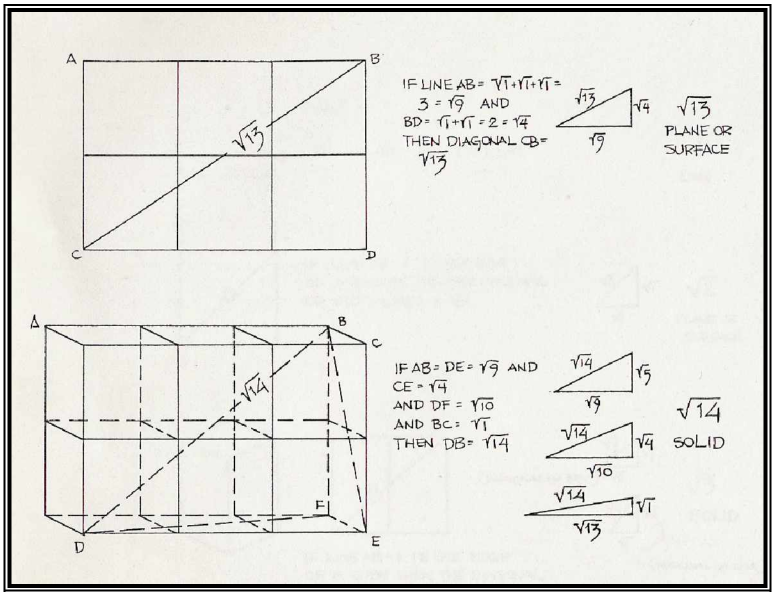
Continuing from SR8 to SR12 . . .

SR	Occurrence
8	Diagonal of four squares (or diagonal of the face of 4 cubes)
9	Diagonal from one corner of 4 cubes to the opposing corner Also the edge of 3 squares or cubes.
10	Diagonal of a triple square (or diagonal of the face of three cubes)
11	Diagonal from one corner of 3 cubes to the opposing corner
12	Diagonal of from one corner of 8 cubes to the opposing corner (shown as line DB in the lower right below)



Part III – Square Roots of 13 and 14

SR	Occurrence
13	Diagonal of six squares (or diagonal of the face of 6 cubes)
14	Diagonal from one corner of 6 cubes to the opposing corner



This pattern or progression continues, I believe, indefinitely, accept that those containing functions of SR of 7 appear 'elsewhere.' I have not determined the 'elsewhere' of any but the one noted above.

This SR7 also appears when one steps into the next dimension, which I have not here illustrated. The SR of 7 also appears somewhere in the Tesseract, or so-called 4-dimensional cube (sorry, can't find my notes & drawing at this time . . .)

I am told by Tofique Fatehi that it may also be found in other ways.
On 21 Mar 2008 he wrote:
"You have listed up to SR5. If you take a double (3D) cube, the distance between the two furthest apart corners is SR6.

Now if you can **get a unit length line perpendicular to this diagonal, which is also perpendicular to the three axes of the 3D cube**,
then you can get a line which is SR7. **This is possible only with 3 hypercubes of 4-dimension."**

He also noted:
"In 4 Dimensions, we can have 4 mutually perpendicular lines, of lengths A, B, C and D, placed end to end and connect the two loose ends by a line H whose length is H = SqRt(Asq + Bsq + Csq + Dsq)
For A = 2 and B = C = D = 1, we get H = SqRt7
I suspect it is possible to get the SqRt of any integer by using 4D hypercubes, but I cannot prove it."

On the following pages is another partial view and notes of some of what is above, from another perspective.

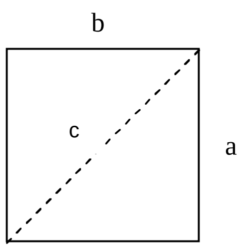
Side Roads and Countries Lanes in the Contemplation of KST
via the Pythagorean 'Theorem' or Euclid's 47th Proposition

by Gary L. Heinmiller, May 2003 –

While doing some basic projections of the Cube many years ago, I found myself working out some additional projections and clusters of the Cube and came across an interesting progression. The gentle reader of this can make of this as they may. I cannot say that I can relate what the significance of the following discussion may be, but it is a bit intriguing.

Sorry, but one would have to read several other of my papers to see the progression of 'geometry' TO the 'illusion of' the Square of the Cube, but Masonically, the Sanctum Sanctorum of KST was a Cube, measuring 20 x 20 x 20 cubits [or 10 x 10 x 10 in the Tabernacle]. In contemplating this one day I did some additional calculation as follows:

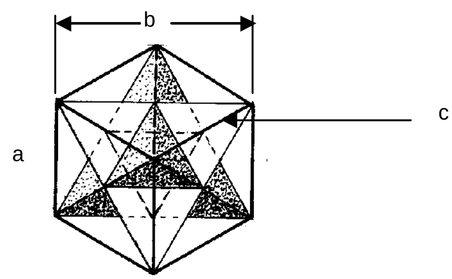
The Square and the Diagonal of the Square:



Let side = 1
by Pythagoras $a^2 + b^2 = c^2$

$1^2 + 1^2 = c^2$
$1 + 1 = c^2$
$2 = c^2$
c = the square root of 2 [the diagonal of a square]
note: if the side = 1, the side is also the square root of 1 which = 1

The Cube and its Diagonal:



Above is a representation of a Cube with its supporting diagonals. Note that the supporting diagonals also give a representation of a Cubic 'Star of David' [a 'Star Tetrahedron'] or 'Seal of Solomon' which is reported by many to be the prime 'shape' of the basic 'structure' of the Universe.

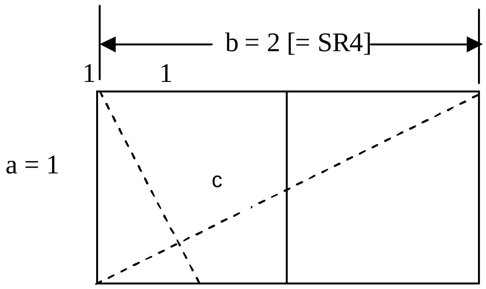
In the above figure:

a = 1
b = the square root of 2
by Pythagoras:
$a^2 + b^2 = c^2$
$1^2 + SR2^2 = c^2$
$1 + 2 = c^2$
c = SR3, where "SR" denotes the 'square root' of the number . . .

At this point we now have representations of the:
SR 1 = side of square
SR 2 = diagonal of the square
SR 3 = diagonal of the cube

The Double Square and its Diagonal:

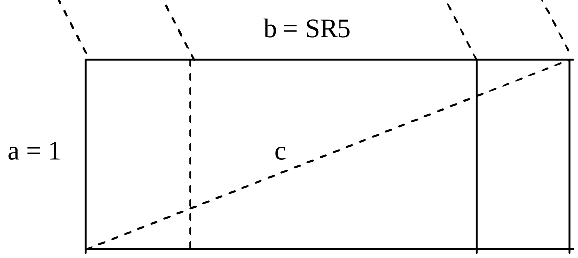
Progressing further, if we note the Double Square we will find:



. . . where we now have that the side of a double square = SR 4
and, by Pythagoras
$a^2 + b^2 = c^2$
$1^2 + 2^2 = c^2$
$1 + 4 = c^2$
c = SR5

or we have now shown SR1, SR2, SR3, SR4 and SR5, SR4 being the side of a double square and SR5 being the diagonal of the double square.

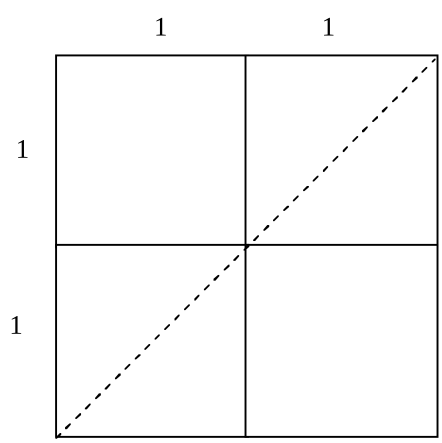
Diagonal of the Double Cube:



again, by Pythagoras:
$a^2 + b^2 = c^2$
$1^2 + SR5^2 = c^2$
$1 + 5 = c^2$
c = SR6

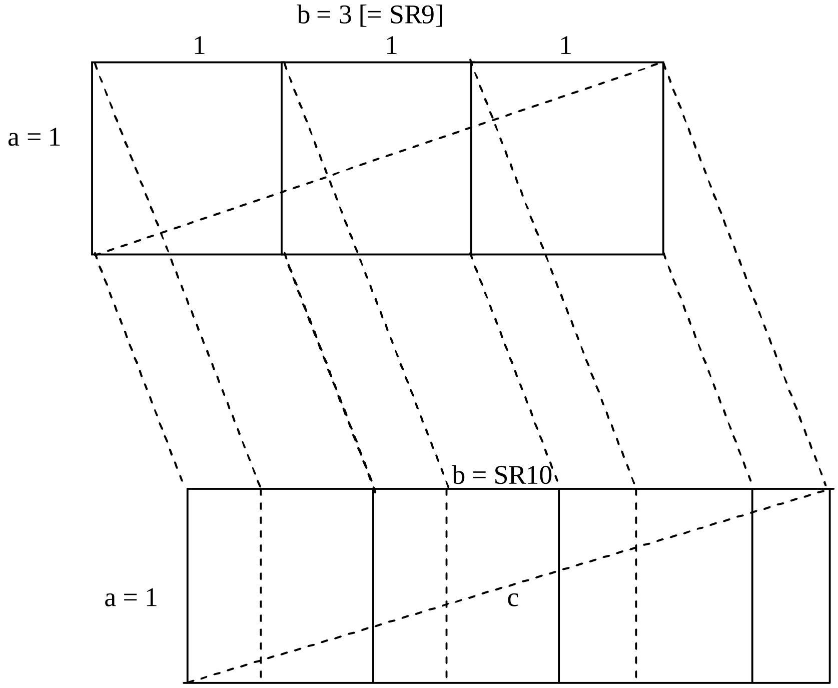
Note: the Double Cube in KST was the Sanctorum, measuring 20 x 20 x 40 cubits.

Diagonal of the Double Double Square:



$2^2 + 2^2 = c^2$; $4 + 4 = c^2$; c = SR8

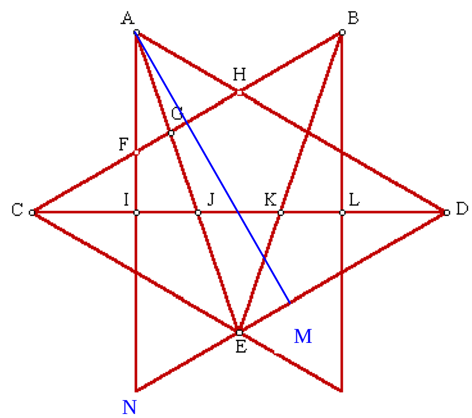
Side and Diagonal of the Triple Square:



and by Pythagoras:
$a^2 + b^2 = c^2$
$1^2 + 3^2 = c^2$
$1 + 9 = c^2$
c = SR10

$1^2 + SR10^2 = c^2$
$1 + 10 = c^2$
c = SR11

The below 2D figure and data were found at http://home.hiwaay.net/~jalison/after2.html
I 'assume' the data is correct: my calculations for SR7 are shown below.



AH = 1.000 inches = √1			
AB = 1.732 inches = √3			
HD = 2.000 inches = √4			
AE = 2.646 inches = √7	FH = 1.000 inches	AG = 0.882 inches	CI = 0.866 inches
AD = 3.000 inches = √9	FG = 0.$\overline{333}$ inches	GJ = 0.706 inches	IJ = 0.520 inches
CD = 3.464 inches = √12	GH = 0.$\overline{666}$ inches	JE = 1.058 inches	JK = 0.693 inches

To solve for AE (and AM), the blue line (M) and point N have been added by the present writer.
Let Blue Line = AM; AN = 3; NM = 3 / 2 = 1.5. By $a^2 + b^2 = c^2$
$(1.5)^2 + AM^2 = 3^2$
$2.25 + AM^2 = 9$; $AM^2 = 9 – 2.25 = 6.75$, therefore
AM = the square root of 6.75 (i.e. 2.59807 . . .)

and EM = NM – LE = 1 - .5 = .5

From which we may derive AE:
$EM^2 + AM^2 = AE^2$
$.5^2 + (2.599807 . . .)^2 = AE^2$
$.25 + 6.75 = AE^2$
$7 = AE^s$
Therefore AE = the square root of 7 (or SR7)