Table 2b

Tertiary Tree of Primitive Pythagorean Triples

Trunk								A ÷ 7	1st Tertiary Branch								A ÷ 7	2nd Tertiary Branches								A ÷ 7	3rd Tertiary Branches								A ÷ 7
PPT	*r*	*s*	*t*	A	4A	8A	*ƒ*		PPT	*r*	*s*	*t*	A	4A	8A	*ƒ*		PPT	*r*	*s*	*t*	A	4A	8A	*ƒ*		PPT	*r*	*s*	*t*	A	4A	8A	*ƒ*	
									5-12-13	4	1	8	30	120	240	**7**																			
3-4-5	2	1	2	6	24	48	**1**		**20-21-29**	12	8	9	210	840	1680	**1**	✓																		
									8-15-17	6	2	9	60	240	480	**7**																			

Making the "blue"-UPPER & LOWER

r=even # satisfying $r^2 = 2st$ & $r^2/2 = st$ & $a = r + s$ $b = r + t$ $c = r + s + t$

for **RED 3-4-5** r=2 $r^2/2=2^2/2 = 2 = st = 1 \cdot 2$; 1,2 become **BLUES** *s* values.

for **RED 3-4-5** Area, A = $(a \cdot b)/2 = (3 \cdot 4)/2 = 6$ and 4A = 4 • 6 = 24 and the Factor Pairs 4,6 become **BLUES** *r* values.

Knowing the *r* & *s* values for the **BLUES**, means the rest of the values are also known:

if $r = 4$ then $r^2/2 = 4^2/2 = 8$ and since s=1, the other Factor Pair, $t = 8$, then $a = r+s = 4+1 = 5$ $b = r + t = 4+8 = 12$ $c = r+s+t = 4+1+8 = 13$ giving the UPPER **BLUE 5-12-13 PPT Branch**.

if $r = 6$ then $r^2/2 = 6^2/2 = 18$ and since $s = 2$, the other Factor Pair, $t = 9$, then $a = r+s = 6+2 = 8$ $b = r + t = 6+9 = 15$ $c = r+s+t = 6+2+8 = 17$ giving the LOWER **BLUE 8-15-17 PPT Branch**.

They both have the same *ƒ*-value as *ƒ* = b - a:

for **5-12-13** *b-a* = 12 - 5 = 7
for **8-15-17** *b-a* = 15 - 8 = 7 (The *ƒ*-value also = the ∑ of **RED** 3+4=7)

Hint: The **MEDIUM Branch** is a hybrid of the **RED** & **BLUE**- see **Table 2c**

Table 2b

Key: PPT=Primitive Pythagorean Triple; *r*=even # such that $r^2/2=st$ where *s,t* are Factor Pairs; A=Area; 4A=4Area; 8A=8Area; $f=b-a$ & $f^2=(b-a)^2$, as $a^2 + b^2 = c^2 = 4A + f^2 = (8A + f^2) - 4A$
The Tree of Pythagorean Triples branches from the **3-4-5 PPT** trunk first into a 3-part main branch, each of which further branches into 2nd, 3rd, 4th, …, tertiary branches. Each tertiary follows the lead *f*-value of its predecessor, but is actually formed as an intermediary to the upper and lower branches of which it is a part. All **PPT**s — with no repeats — are to be found. ***Pythagoras*** first discovered the UPPER branch sequence, ***Plato*** (a century later) discovered the LOWER branch sequence. The MIDDLE branch sequence follows as an intermediary, hybrid sequence of the UPPER and LOWER.
Using the *Expanded Dickson Method* on the **BBS-ISL Matrix**, every **PPT** branch is accounted for by the previous branch. This is done by enlisting the *r,s,t*,A,4A,8A,*f* associated values. All these values are derived directly from the respective **PTT** by both algebra and geometry. In **Table 2a** we looked at the overall. In **Table 2b**, we examine how the UPPER and LOWER branches (blue) are made from the trunk (red). In **Table 2c**, we see how the MIDDLE branch (red) is formed from the UPPER and LOWER (blue) branches and the trunk (red). As a fractal, this ***Number Pattern Sequence*** that defines the first branchings, continues through the entire tree. **Table 2d** shows BLUE branching to **2nd Tertiary Branches**. **Table 2e** reveals the power of *ƒ*. **Table 2f** tells all.