Abstract: This paper develops the formula that calculates the sum of simple composite numbers by golden patterns.

Keywords: Golden Pattern, rough number, prime number, simple composite number.

Golden patterns
All the golden patterns have the same characteristics, (harmony, equilibrium, balance, etc) for which I have discovered a formula to calculate the sum of simple composite numbers by Golden patterns.

Sum of simple composite numbers by Golden Patterns

\[
\sum Nc = \frac{Pt^2 + Pt - Pt \times Nps}{2}
\]

Nc = Simple composite number
Nps= Quantity of simple prime number by Golden Pattern [http://vixra.org/abs/1803.0178]

A) Example 3-Golden Pattern [http://vixra.org/abs/1803.0098]

\[
\sum_{i=1}^{18} Nc = 2 + 3 + 4 + 6 + 8 + 9 + 10 + 12 + 14 + 15 + 16 + 18 = 117
\]

Applying the formula

\[
\sum_{i=1}^{18} Nc = \frac{18^2 + 18 - 18 \times 6}{2} = 117
\]

B) Example 5-Golden Pattern

\[
\sum_{i=1}^{90} Nc = \frac{90^2 + 90 - 90 \times 24}{2} = 3.015
\]
C) **Example 7-Golden Pattern**

\[
\sum_{1}^{630} Nc = \frac{630^2 + 630 - 630 \times 144}{2} = 153.405
\]

D) **Example 11-Golden Pattern**

\[
\sum_{1}^{6.930} Nc = \frac{6.930^2 + 6.930 - 6.930 \times 1.440}{2} = 19.026.315
\]

E) **Example 13-Golden Pattern**

\[
\sum_{1}^{90.090} Nc = \frac{90.090^2 + 90.090 - 90.090 \times 17.280}{2} = 3.279.771.495
\]

We can continue adding examples with the following Golden patterns.

| Size of Golden Patterns | \(
\sum_{1}^{Nc}
\) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Golden Pattern</td>
<td>18</td>
</tr>
<tr>
<td>5-Golden Pattern</td>
<td>90</td>
</tr>
<tr>
<td>7-Golden Pattern</td>
<td>630</td>
</tr>
<tr>
<td>11-Golden Pattern</td>
<td>6.930</td>
</tr>
<tr>
<td>13-Golden Pattern</td>
<td>90.090</td>
</tr>
</tbody>
</table>

**Table 1**
Sum of simple composite numbers by Golden Pattern and the next patterns

\[
Patterns \ n \sum Nc = \left( \frac{Pt^2 + Pt - Pt \ast Nps}{2} \right) \ast Nex - Pt \ast (n - 1) =
\]

\(Nc\) = Simple composite number  
\(Pt\) = Size of the Golden Pattern  
\(Nps\) = Quantity of simple prime number by Golden Pattern

\(Nex\) =Next Pattern (Golden Pattern =1, Pattern2 =3, Pattern3 =5, Pattern4 =7, Pattern6 = 9 ...........) Each pattern is always linked with odd numbers.  
\(n\) = Pattern Number (Golden Pattern 1 =1, Pattern 2 =2, Pattern 3 =3, Pattern 4 =4, ............)

A) Example 3-Golden Pattern

Golden Pattern 1 \[\sum_{1}^{18} Nc = \left( \frac{18^2 + 18 - 18 \ast 6}{2} \right) \ast 1 - 18 \ast (1 - 1) = 117\]

Pattern 2 \[\sum_{19}^{36} Nc = \left( \frac{18^2 + 18 - 18 \ast 6}{2} \right) \ast 3 - 18 \ast (2 - 1) = 333\]

Pattern 3 \[\sum_{37}^{54} Nc = \left( \frac{18^2 + 18 - 18 \ast 6}{2} \right) \ast 5 - 18 \ast (3 - 1) = 549\]

Pattern 4 \[\sum_{55}^{72} Nc = \left( \frac{18^2 + 18 - 18 \ast 6}{2} \right) \ast 7 - 18 \ast (4 - 1) = 765\]

The sum of composite numbers generates a difference between patterns of 216.

Formula to calculate the difference

\[Diff = 2 \ast (Golden Pattern 1 \sum_{1}^{18} Nc) - Pt\]

\[Diff = 2 \ast 117 - 18 = 216\]

B) Example 5-Golden Pattern

Golden Pattern 1 \[\sum_{1}^{90} Nc = \left( \frac{90^2 + 90 - 90 \ast 24}{2} \right) \ast 1 - 90 \ast (1 - 1) = 3.015\]

Pattern 2 \[\sum_{91}^{180} Nc = \left( \frac{90^2 + 90 - 90 \ast 24}{2} \right) \ast 3 - 90 \ast (2 - 1) = 8.955\]
\[
\text{Pattern 3 } \sum_{181}^{270} N_c = \left( \frac{90^2 + 90 - 90 \times 24}{2} \right) \times 5 - 90 \times (3 - 1) = 14.895
\]

\[
\text{Pattern 4 } \sum_{271}^{360} N_c = \left( \frac{90^2 + 90 - 90 \times 24}{2} \right) \times 7 - 90 \times (4 - 1) = 20.835
\]

The sum of composite numbers generates a difference between patterns of 5.940

Formula to calculate the difference

\[
Diff = 2 \times (Golden \ Pattern \ 1 \sum_{1}^{90} N_c) - Pt
\]

\[
Diff = 2 \times 3.015 - 90 = 5.940
\]

C) Example 7-Golden Pattern

\[
\text{Golden Pattern 1 } \sum_{1}^{630} N_c = \left( \frac{630^2 + 630 - 630 \times 144}{2} \right) \times 1 - 630 \times (1 - 1) = 153.405
\]

\[
\text{Pattern 2 } \sum_{631}^{1260} N_c = \left( \frac{630^2 + 630 - 630 \times 144}{2} \right) \times 3 - 630 \times (2 - 1) = 459.585
\]

\[
\text{Pattern 3 } \sum_{1261}^{1890} N_c = \left( \frac{630^2 + 630 - 630 \times 144}{2} \right) \times 5 - 630 \times (3 - 1) = 765.765
\]

\[
\text{Pattern 4 } \sum_{1891}^{2520} N_c = \left( \frac{630^2 + 630 - 630 \times 144}{2} \right) \times 7 - 630 \times (4 - 1) = 1,071.945
\]

The sum of composite numbers generates a difference between patterns of 306.180

Formula to calculate the difference

\[
Diff = 2 \times (Golden \ Pattern \ 1 \sum_{1}^{630} N_c) - Pt
\]

\[
Diff = 2 \times 153.405 - 630 = 306.180
\]
Final conclusion

The formula is a simple method that helps us to decipher the sum of the simple composite numbers that exist by pattern. All Golden Patterns are closely linked, and this formula manages to connect absolutely to all of them.

This Paper is extracted from my book The Golden Pattern II

References
Enzo R. Gentile, Elementary arithmetic (1985) OEA.
Burton W. Jones, Theory of numbers
Iván Vinográdov, Fundamentals of Number Theory
Niven y Zuckermann, Introduction to the theory of numbers
Dickson L. E., History of the Theory of Numbers, Vol. 1
Zeolla Gabriel Martin, 7-Golden Pattern, Formula to Get the Sequence. http://vixra.org/abs/1801.0381
Zeolla, Gabriel Martin, Simple prime numbers per Golden Patterns http://vixra.org/abs/1803.0178
Zeolla, Gabriel Martin, Sum of Simple prime numbers http://vixra.org/abs/1803.0225
Zeolla, Gabriel Martin, Simple composite numbers by Golden Patterns http://vixra.org/abs/1803.0298

Professor Zeolla Gabriel Martin
Buenos Aires, Argentina
03/2018
 gabrielzvirgo@hotmail.com