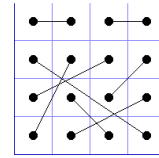


Theorem 5 [connection figure (1122 3456 5768 4873)]



Let M be a general 4×4 magic square of connection figure (1122 3456 5768 4873), then there exist integer numbers k, r such that:

$$M = \begin{matrix} k+7r & k+14r & k & k+21r \\ k+15r & k+13r & k+9r & k+5r \\ k+12r & k+4r & k+16r & k+10r \\ k+8r & k+11r & k+17r & k+6r \end{matrix}$$

By $k+tr \rightarrow 1+r$, $0 < t$, and $k \rightarrow 1$ the square M is mapped onto a general magic square with entries from the symmetric set $\{1, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 22\}$.

Since for $N=22$ there are only the 2 possibilities: $k=1, r=1$ or $k=22, r=-1$, any general 4×4 general magic square of connection figure (1122 3456 5768 4873), with entry 1, can be derived from either $k=1, r=t$ or $k=N, r=-1$, where $N=1+21t, 0 < t$.

Proof

By solving the linear equations for M .

Remark

There is a one to one mapping F from the set of general 4×4 magic squares of connection figure (1122 3456 5678 8347) onto the set of general 4×4 magic squares of connection figure (1122 3456 5678 4873),

$$F: \begin{matrix} c01 & c02 & c03 & c04 \\ c05 & c06 & c07 & c08 \\ c09 & c10 & c11 & c12 \\ c13 & c14 & c15 & c16 \end{matrix} \rightarrow \begin{matrix} c04 & c03 & c02 & c01 \\ c10 & c12 & c09 & c11 \\ c07 & c05 & c08 & c06 \\ c13 & c15 & c14 & c16 \end{matrix}$$

Moreover, there is an injection i from the set of 4×4 general magic squares with connection figure (1122 3456 5768 4873) into the set of 4×4 general magic squares of connection figure (1122 3443 5665 7788), defined by

$$i: \begin{matrix} c01 & c02 & c03 & c04 \\ c05 & c06 & c07 & c08 \\ c09 & c10 & c11 & c12 \\ c13 & c14 & c15 & c16 \end{matrix} \rightarrow \begin{matrix} c03 & c04 & c13 & c06 \\ c09 & c12 & c14 & c07 \\ c11 & c10 & c15 & c08 \\ c02 & c01 & c16 & c05 \end{matrix}$$