For the $m \times n$ chessboard with $m \leq n$, either board has a closed knight's tour, so that $T(m, n) = 0$, or else

(a) $T(m, n) = 1$, where m and n are both odd except for $m = 3$ and $n = 5$;
(b) $T(4, n) = 2$ for all $n \geq 4$;
(c) $T(3, 4) = T(3, 8) = 2$, $T(3, 5) = 3$, $T(3, 6) = 4$;
(d) $T(2, n) = 2n - 2$ for $n \geq 3$;
(e) $T(1, n)$ and $T(2, 2)$ are undefined.

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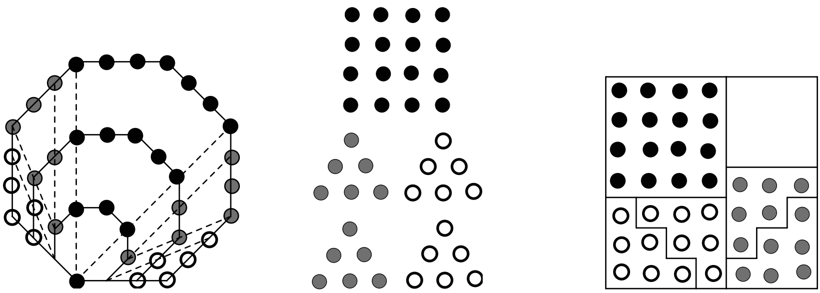
Proof Without Words: Every Octagonal Number Is the Difference of Two Squares

$$O_k = 1 + 7 + 13 + 19 + \cdots + (6k - 5) = (2k - 1)^2 - (k - 1)^2$$

For $k = 4$:



$$T_k = 1 + 2 + \cdots + k \ \Rightarrow\ O_k = k^2 + 4T_{k-1} \ \Rightarrow\ O_k = (2k - 1)^2 - (k - 1)^2.$$

REFERENCE

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