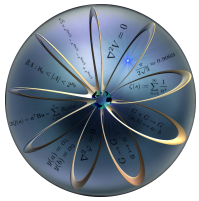

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perfect ruler

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Synonym	Golomb ruler

A *perfect ruler* of length n is a ruler with a subset of the integer markings $\{0, a_2, \ldots, n\} \subset \{0, 1, 2, \ldots, n\}$ that appear on a regular ruler. The defining criterion of this subset is that there exists an m such that any positive integer $k \leq m$ can be expresses uniquely as a difference $k = a_i - a_j$ for some i, j. This is referred to as an *m-perfect ruler*.

A 4-perfect ruler of length 7 is given by $\{0, 1, 3, 7\}$. To verify this, we need to show that every number $1, 2, \ldots, 4$ can be expressed as a difference of two numbers in the above set:

$$
\begin{aligned}
1 &= 1 - 0 \\
2 &= 3 - 1 \\
3 &= 3 - 0 \\
4 &= 7 - 3
\end{aligned}
$$

An optimal perfect ruler is one where for a fixed value of n the value of a_n is minimized.