Modular Leech Trees of Order at most 9

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In 1975 John Leech asked when can the edges of a tree on n vertices be labeled with positive integers such that the sums along the paths are exactly the integers $1, 2, \ldots, \binom{n}{2}$. He found five such trees, and no additional trees have been discovered since. In 2009 Leach and Walsh introduced the idea of labeling trees with elements of the group $\mathbf{Z}_k$ where $k = \binom{n}{2} + 1$ and examined the cases for $n \leq 6$. In this talk we show some necessary conditions for the existence of modular leech trees and show all examples for $n \leq 9$.

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