A Cayley tree is a symmetric regular tree in which each node is connected to the same number $k$ of others. Here, for example, is a Cayley tree for $k = 3$:

Show that the number of nodes reachable in $d$ steps from the central node is $k(k - 1)^d$ for $d \geq 1$. Hence find an expression for the diameter of the network in terms of $k$ and the number of nodes $n$. Does this network exhibit the small-world effect, defined as having a diameter that increases as $\log n$ or slower?