When designing a kitchen for a client in a kitchen design studio, the designer proposes a layout of the cabinets, fixtures, and appliances that should be in the kitchen. To automate this step, we propose a new formal model of a kitchen layout and define the corresponding Kitchen Layout Problem. To solve this problem efficiently in practice, we create two implementations, one using mixed integer linear programming, and another using the constraint modeling language MiniZinc. The generated layouts are realistic and capture well the intent of our model. We compare the performance of several available solvers and modeling approaches. While some solvers take unrealistically long to finish, the commercial solver Gurobi and the open-source solver CP-SAT both finish reliably within tens of seconds, with CP-SAT usually being faster.