Monument

Spoiler

To simplify, consider $p, q, r \approx n$.

Naive solution: test all $O(n^2)$ possibilities for choosing a and b, in all possible $O(n^3)$ locations. At least $O(n^5)$ time.

Basic dynamic programming: fill values $d[x, y, z, k] =$ maximum height b for a rectangle with base length $a = k$ and a corner at (x, y, z). Results in $O(n^4)$ time.

Proposed solution: precompute in $O(n^3)$ time and space for each (x, y, z) what is the side-length of maximal full square with e.g. lower-right corner at (x, y, z) (this is computed along one of the three orientations: xy-plane, xz-plane and yz-plane). Then the solutions for the current orientation can be computed with an $O(n^3)$ time traversal over all (x, y, z). The final solution is taken as the best found among three traversals (and precomputations): one for each orientation.