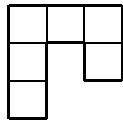


The following problem appeared as Problem 3 on the most recent International Mathematical Olympiad.

Define a hook to be a figure made up of six unit squares as shown in the diagram



or any of the figures obtained by applying rotations and reflections to this figure. Determine all $m \times n$ rectangles that can be covered with hooks such that

- the rectangle is covered without gaps and without overlaps*
- no part of a hook covers area outside the rectangle.*

In this expository talk we will show how group theory can be employed to attack this sort of problems.