Examples (Analysis) of Non-Classical Games in Combinatorial Geometry

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Some games using polyforms (pentominoes, hexiamonds) are considered, see for example [1], [2]. These games are not well known and there are no classical theorems that immediately tell us that, in this game, there is (or is not) a winning strategy for the first player. Comments will be made on some of the final theses of university students, as well as on pupils' research papers analysing such games.

Example 1. Two players, one after the other, select one pentomino until they have taken six pentominoes each. The player who is the first one to be able to make two symmetrical 15-ominoes (within the time allowed) wins. One can ask for more, namely that these 15-ominoes have an axis of symmetry and no voids (in other words, they are polygons).

Example 2. Two players divide a set of hexiamonds, each taking one hexiamond in turn. Each player tries to assemble two polygons (18-iamonds) from his selected six hexiamonds in the time allowed, such that the sum of the total number of sides is the smallest.

Example 3. Two players divide a set of hexiamonds, each taking one hexiamond in turn. The player who is the first one to be able to place his six hexiamonds in the given 6-gon shown in Figure 1 (within the time allowed) wins.
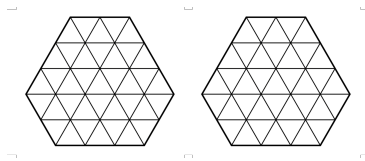

Figure 1: Two identical 6-gons – 37-iamonds

References

[1] Golomb S. W.: *Polyominoes: Puzzles, Patterns, Problems, and Packings, Princeton* University Press, 1996.

[2] https://en.wikipedia.org/wiki/Polyform